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Volume 7
Number 12
February 1990
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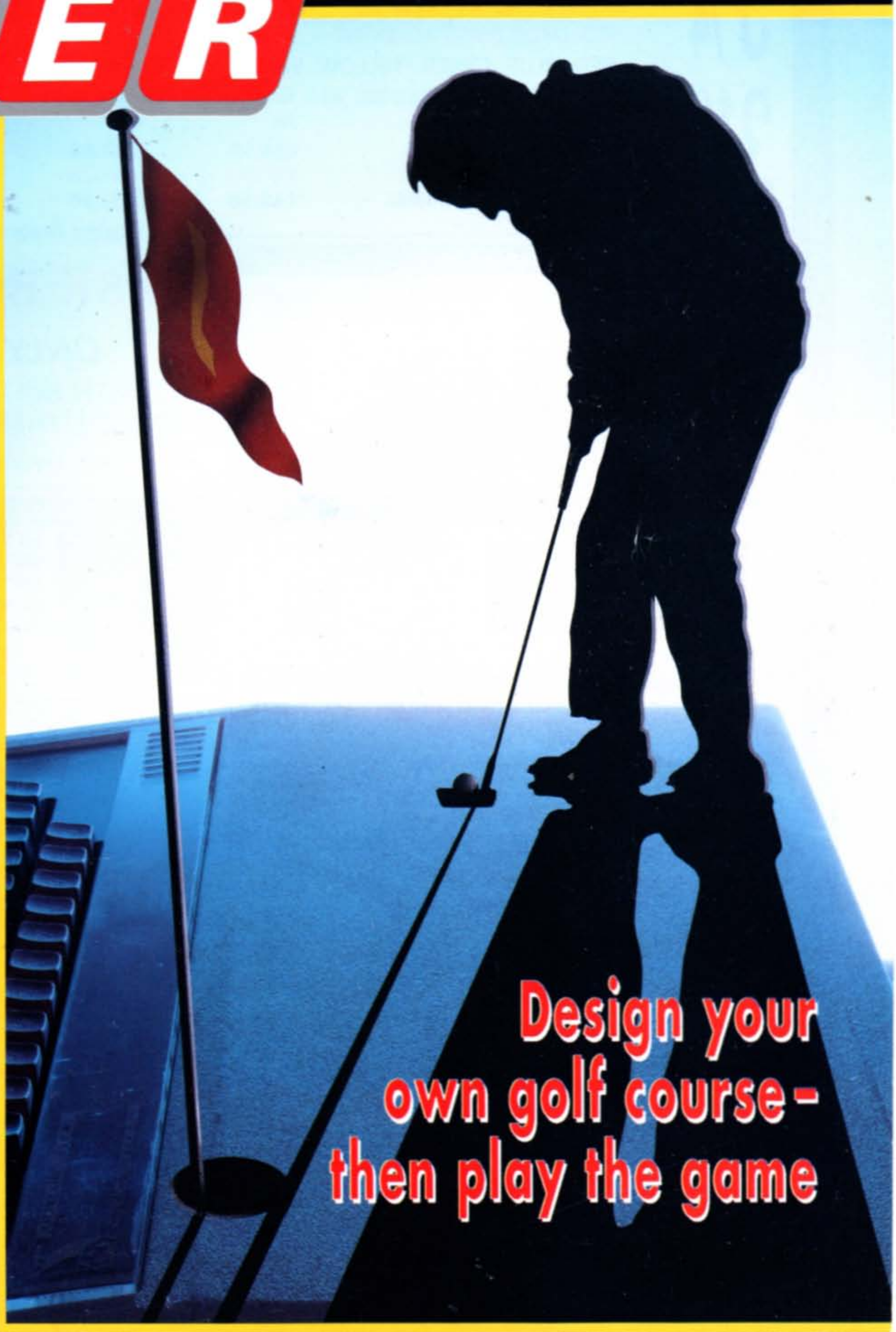

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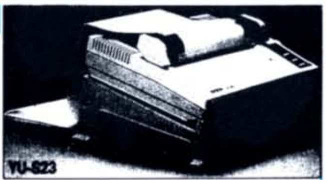

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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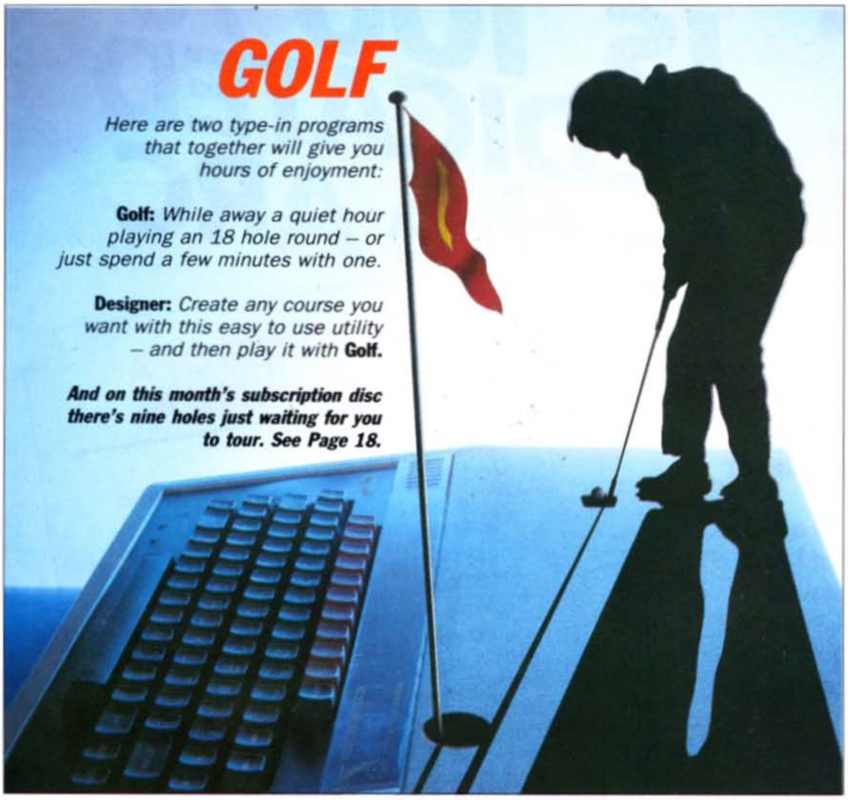

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MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 108** to find just what you're looking for – from cheap modems to complete computer systems.

✓ **For full details of how to use the Checksums, see the article on Page 72 of this issue.**

✳ **The Type-it-in symbol indicates that the feature contains at least one full length listing for you to key in on your micro.**

Next month in THE MICRO USER

PRIZES
Fantastic eighth birthday competition

SOUNDS
Twin stereo speaker stacks for your micro

STRATAGEM
Fascinating and educational game

GAME
Arcade action with Dickie Brickie

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Indirection Operators Explained
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Postbag - A chance to air your views
Hints and Tips

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An Icon Selector - to add to your own progams
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Pipedream 3
Clares' Armadeus
Instigator from Dabs Press
MewSoft's Organiser

(RISC User October 1989 issue)

Archimedes

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News BEAT

Hacking curb must wait

NEW laws to curb computer hacking have been left out of the Government's proposed legislation for the coming year.

While Secretary of State for Trade and Industy Nicholas Ridley commended October's Law Commission report on computer misuse (see *The Micro User,* January) and recognised that it is a nettle which must be grasped, he has surprisingly failed to act.

The Queen's speech at the state opening outlined 15 bills for next year but did not include the new computer laws recommended in the Law Lords' report.

A spokeswoman for the Department of Trade and Industry said Mr. Ridley was still of the opinion that the Law Lords report would make a firm basis for new legislation and the official government line is still that computer misuse remains an important issue which must be dealt with. "In terms of the Queen's speech, the government has a heavy legislative programme for this session and other matters have taken precedence", she said.

Reflecting the strong lobby for action on computer misuse, the goverment has said it will give all its support and help to any individual wishing to raise a private member's bill based on the Law Commission's recommendations. The report suggested introducing three new criminal offences to combat hacking.

Not mach hope for refunds

PEOPLE owed money by the failed Archimedes add-on firm Mach Technology have been told they are unlikely to recoup any cash.

Following a creditors' meeting, liquidator John B. Taylor reported: "Unless substantially more is realised than shown in the statement of affairs, there is little likelihood of any dividend to the unsecured creditors".

The statement showed debts of more than £22,600 to trade creditors and £28,600 to customers. Total creditors amounted to £53,726 with assets of £1,768 leaving a net deficiency of £51,960.

Pupils in the market

LOWER sixth form pupils at a Bristol school have typified the aims of Young Enterprise by setting up their own software company and producing a computer game which they intend to market.

Y.E.S. Marketing is the firm set up by the youngsters at Queen Elizabeth Hospital School and their product is Balls, a two player game for BBC B and Master machines.

Led by production manager and programmer Matthew Spencer, the Lower Sixth sold their fellow pupils shares in the company with the aim of giving them a good return in eight months time

Any residue will go to charity and to provide small cash prizes for members of the company who have achieved the most.

Last year's Young Enterprise company at Queen Elizabeth's managed to double the money invested.

The game revolves around 3D grids which have to be crossed by a ball in as little time as possible. Blue squares are safe, purple square make the player's ball jump, white squares make you go faster, yellow stop you and black are fatal.

Available from January 9, the game costs £5 including postage and packing and can be obtained by writing to Y.E.S. Marketing, Queen Elizabeth's Hospital School, Jacobs Wells Road, Bristol, BS8 1JX. A full review will appear in the next issue of *The Micro User.*

Magnetic attraction

FANTASY role play adventurers should have some rare treats in store for the nineties thanks to a new and powerful alliance in the software world.

Virgin Mastertronic has signed a long term licensing deal with adventure/FRP experts Magnetic Scrolls.

At present under wraps, the first progeny of this marriage will hit the marketplace in the late spring. The result of two year's programming it will be available in an Archimedes version.

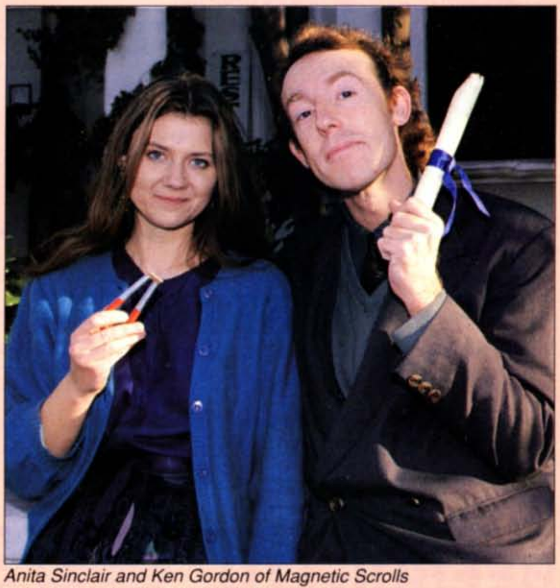
Magnetic Scrolls was founded in 1984 by Anita Sinclair and Ken Gordon. Its first package The Pawn went on to collect many major awards and over the last five years it has achieved an enviable reputation in the industry with products of consistently high quality.

"We had many substantial offers for our new product", said Anita Sinclair. "What made me choose Virgin was their commitment to the market place and the resources they are willing to put behind good product.

Most importantly, they are nice people to do business with".

Managing director of Mastertronic Nick Alexander added: "Over the last 18 months we have demonstrated our commitment to top quality arcade games.

"We now feel ready to do the same with adventure games and they don't come any better than those from Magnetic Scrolls".



Anita Sinclair and Ken Gordon of Magnetic Scrolls celebrate their deal with Virgin Mastertonic

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Applications II for the BBC Micro and Master Series

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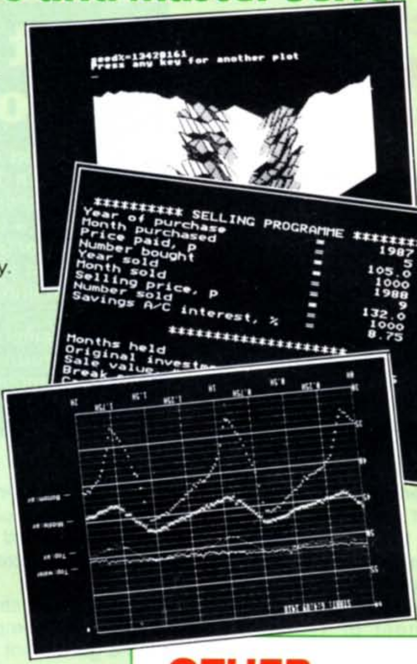

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seed%=13428161
Press any key for another plot
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Price paid, p                   =     105.0
Number bought                   =      1000
Year sold                       =      1988
Month sold                      =         9
Selling price, p                =     132.0
Number sold                     =      1000
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Sale value
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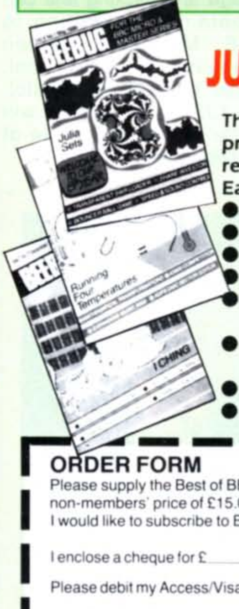

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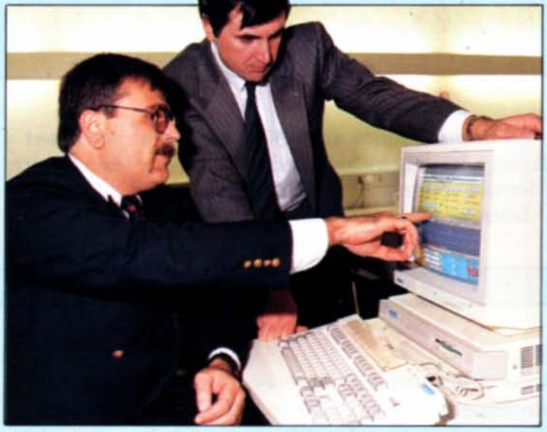


Hutch Curry explains his entry in Acorn's caring competition

Arc aids for medicine

A QUALITY control system for laboratories and a spectral analysis program have carried off the honours in the Acorn Caring Competition organised by Acorn Computers to find the best possible healthcare package for use on its machines.

Dr. John Dixon of John Dixon's Research in Kent entered his real-time quality control package for multichannel laboratory analysers.

Written for the Archimedes, it provides instant assessment of current and past quality control for such operations as blood testing.

Second prizewinner was Dr. Hutch Curry, of the Burden Neurological Institute, with his spectral analysis program for the Archimedes 310.

Developed as a cost effective method of monitoring background EEG activity in an operating theatre or during intensive care, the system is designed for use by doctors and nurses and requires minimal training.

Both winners received an Archimedes 420 computer.

Dig this...

FEW people know that there are more than 700 different soils in England and Wales. To combat this ignorance, C.R.Software (0970 623017) has gritted its teeth, taken an earthy look at a dirty problem and dug up a gem of a program called Name That Soil.

Based on more than 50 years of research by The Soil Survey, the package helps users to learn about the fundamentals of soil formation. After answering questions about particular soils, they are rewarded with the soil's group, series of names, parent material and an annotated picture of the soil profile.

For use on BBC Model B, B+ and Master the program comes on a 5.25in 80 track disc and costs £30. Buyers with a 40 track disc drive can get the package on two discs or both sides of the same disc.

Micros going on patrol

TYNESOFT'S New Year treat for BBC Micro owners takes them to the rough, tough world of California. Its Beverley Hills Cop in which the player joins Detective Axel Foley on a day's patrol.

First duty is to try and prevent all-out warfare on the streets by stopping consignments of arms getting to gangland trouble makers.

Action moves on to a car chase followed by a commando-type game and ending with a puzzling maze. BBC Micro/Electron cassette costs £9.99. Disc £14.99.

Interest hits sales

SALES figures for more than half of the country's top 250 computer dealers have been affected by high interest rates and 78 per cent have a pessimistic view of the future if they continue.

These are some of the findings in the latest Top 250 dealer report from market researchers Romtec.

As part of its regular dealer report, Romtec carried out a supplementary analysis into the effects of increased interest rates on end-user sales in the computer industry.

Dealers were asked if the rates had affected their sales to end users in the Summer quarter. More than 55 per cent said sales had been impacted. Of those, one half felt that the effect was marginal and the remainder said the effect was moderate or even considerable.

There was a pessimistic view of the future with 78.3 per cent anticipating detrimental effects if high interest rates continue.

Over one third of dealers included in the survey felt that sales were depressed in budget conscious sectors such as the consumer or retail markets. Fifteen per cent felt business levels had been affected considerably in the last quarter, 45.7 per cent felt they had been affected marginally and 39 per cent experienced moderate problems.

Three in four of the top dealers said profit margins had been squeezed. Those whose margins had not been affected felt this was due to the value added nature of the service they offered.

The full 250 dealer report can be obtained from Romtec (0628 770077) for £695 a copy.

Expanding market

ACORN Computers' latest BBC Micro, the A3000, has received a strong vote of confidence in the High Street.

It is now being stocked in ten leading John Lewis Partnership stores and four Allders stores.

Aimed particularly at education and recreation, computer hobbyists, music enthusiasts and small businesses, the A3000 continues to be stocked at flagship stores in the Dixons chain.

"The machine has met with an extremely enthusiastic response ever since its launch earlier this year", said Acorn's general sales manager Terry Shurwood. "The new agreements with John Lewis and Allders will further enhance the product's High Street visibility and increase sales".

In addition to its own direct dealers, Acorn has three distributors, Kelator, AB First and Hugh Symons Distribution Services who supply a nationwide dealer network. The A3000 costs £746.

Best buy

ELECTRICIAN Michael Graham (24) from Dover-by-Cockermouth, Cumbria won himself a £500 video recorder when he bought the 500,000th copy of Mini Office, the small business package from Database Software (0625 878888).

"I couldn't be more pleased both with Mini Office and the unexpected bonus that went with it", he said.

BEEBUG - THE ARCHIMEDES SPECIALIST

The NEW BBC Micro - The A3000

Ideal for home, education and business use, this powerful computer includes the multi-tasking Operating System, RISC OS. BBC Basic V and a BBC B emulator is supplied as standard. An optional PC emulator disc allows over 90% of DOS software to be used including Lotus, dBase III, MS Word and Wordperfect.

NOW WITH PHILIPS CM8833 MONITOR

At no extra charge we are now supplying the Philips CM8833 colour monitor as standard with all colour systems. It features a video input and stereo sound through a custom lead supplied by Beebug with the monitor. If preferred we are still happy to supply the standard high quality Acorn colour monitor.

ACORN A3000 SERIES		
0225G	A3000 Entry System	649.00
0256G	A3000 Colour System	838.00
ARCHIMEDES 300 SERIES		
0193G	310 Entry System	899.00
0195G	310 Colour System	1088.00
0257G	310M Entry System	959.00
0259G	310M Colour System	1148.00
ARCHIMEDES 400 SERIES		
0260G	410/1 Entry System	1199.00
0261G	410/1 Colour system	1286.00
0262G	420/1 Entry System	1699.00
0264G	420/1 Colour System	1786.00
0275G	440/1 Entry System	2499.00
0276G	440/1 Colour System	2586.00

THESE PRICES EXCLUDE VAT

SEE SPECIAL

OFFERS BELOW

The Acorn Colour monitor is available until 31st January for an incredible £100 inc VAT when purchased with a 400 series computer.

This offer is subject to availability.

SPECIAL DISCOUNTS FOR TEACHERS

Please phone for further information.

FREE ON-SITE MAINTENANCE

All new 400 series and A3000 computers purchased through Beebug include one years On-Site Maintenance. Should your machine fail an engineer will call at your home or place of work within 24 hours to repair the machine.

9 Months 0% Finance

Under this scheme you may purchase an Archimedes A3000, 300 or 400 Series computer (base, mono or colour) by an initial deposit and 9 payments at monthly intervals. There is no charge to you for this service.

The table below shows some examples of the repayments on various machines.

Machine	Deposit	9 Payments
A3000	71.35	75.00
A3000 Colour	99.70	96.00
310	106.85	103.00
310 Colour	126.20	125.00
310M	112.85	110.00
310M Colour	132.20	132.00
410/1	145.85	137.00
410/1 Colour	155.85	147.00
420/1	198.85	195.00
420/1 Colour	208.85	205.00
440/1	290.85	287.00
440/1 Colour	300.85	297.00

THESE PRICES INCLUDE VAT

If you wish to take advantage of this scheme please telephone us and we will send you further details. Finance over 12/24/36 months is also available.

SPECIAL NEW YEAR OFFER

Archimedes 310, backplane, 20 meg Hard Disc and Acorn colour monitor.

Stock code 0185G **£1349.00 exc. VAT**

Very limited offer only - subject to availability

RISC USER & BEEBUG MEMBERS BUYING AN ARCHIMEDES SYSTEM WILL RECEIVE FREE:

A3000 - On Site Maintenance, Pacmania, printer lead, 10 x 3.5" discs & lockable disc box. Members using the 0% finance offer receive On-Site Maintenance only.

310 - PC Emulator, Printer Lead, Ten 3.5" discs & lockable disc box (NOT with New Year Offer).

410/1 - On-Site Maintenance, and items to the value of £110 (Entry system) or £123 (Colour system). Members using the 0% finance offer receive free On-Site Maintenance only.

420/1 - On-Site Maintenance, and items to the value of £167 (Entry system) or £180 (Colour system). Members using the 0% finance offer receive On-Site Maintenance, 10 x 3.5" discs.

440/1 - On-Site Maintenance and items to the value of £259 (Entry system) or £272 (Colour system). Members using 0% finance receive free On Site Maintenance, 10 discs & box plus either £45 (Entry system) or £65 (Colour system).

Please phone or write to receive a copy of our new FREE 54 page retail catalogue.

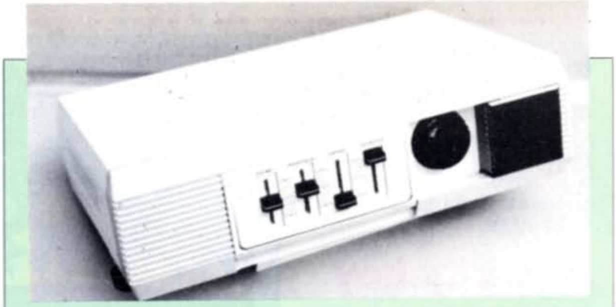
117 Hatfield Road, St Albans Herts AL1 4JS Tel: (0727) 40303 Fax: (0727) 60263

Problem capped

ACCESS Keyboards (0734 663333) has introduced a new line in key caps as an alternative to using the function key strip on Acorn machines. The clear topped replacement keys do away with the need to scribble new key functions on sticky paper. Prices vary with quantity from £1 each for 10 to 63p each for 100.

Quiz the experts

DON'T forget the Mid-Winter Open Day at Watford Electronics (0923 37774) on Sunday, January 28. It is jointly sponsored by Database Publications and Acorn Computers. Our editorial staff will be on hand along with Acorn experts and top software houses.



Micros can put on a show

A USEFUL new training aid launched by Epson is a colour projector which is compatible with the whole range of Acorn machines from the BBC B to the A3000 and Archimedes and can also be used with other computers, video and television.

Weighing in at 13lb, the portable machine can project images on to screen as large as 12ft by 12ft or on one measuring just inches. It can multi-task up to three input devices, changing from one to another at the flick of a switch and has been praised by trainers and trainees during recent field trials.

First stocks of the projector should be delivered in February. It will cost £3,444 and one outlet from which it will be available is Solitaire (0480 67945).

Law on-line

RECENT Department of Industry statistics show that the need to comply with employment law costs the average company more than £5,000 a year. Where health and safety laws are concerned this can be as much as £13,500.

The best way to avoid these high costs is to get good advice on the relevant legislation and that is now available to computer users through the MicroLink communications service (0527 28515).

This new facility has been launched by MicroLink in conjunction with professional consultant Premier Employment Services which gives specialist advice on personnel and health and safety law 24 hours a day, 365 days a year.

"Making such a service available to subscribers minimises the risk for management", said MicroLink's marketing manager Martin Turner. "Instead of going through the lengthy legal process, subscribers to MicroLink can now consult their computer terminals".

The charge is £3 for each inquiry and in most cases answers are given in the same working day.

Talking back...

IT may not tell you to fasten your seat belt, but your BBC Micro could soon be voicing other commands thanks to David Sands, the man responsible for the first talking dashboard.

From his company Sands Technology (0223 420288), comes Speakeasy II, a phonetic speech synthesiser which makes it easy and cost effective to add synthetic speech to computers. It produces clear and natural speech by programming a model of the human vocal tract.

The new programing method includes a unit called Starpabet, a spelling system which puts the user in control of such things as pronunciation and inflexion. Speakeasy II can function as an RS232 peripheral or as a standalone unit. It has its own HM64180 microprocessor and battery–backed cmos ram for holding several messages which can then be spoken by simply shorting a digital input to ground.

Xmas came early at the Shopper Show

THEY came, they queued, they jostled and they went away with armfuls of Christmas bargains. Including trade passes, some 30,000 visitors packed into Alexandra Palace for the three days of the Computer Shopper Show making it the most successful pre-Christmas computer bonanza to date.

Support for the cross-format show took everyone by surprise with congested roads, clogged car parks and massive queues.

On more than one occasion the doors had to be temporarily closed and toward the end of the final day 3,000 hopefuls had to be turned away.

Organisers Database Exhibitions and sponsors Computer Shopper magazine were forced into putting out appeals on both Capital Radio and LBC begging people not to come to the show. In the Palm Court the world's largest Christmas stocking was soon filled with balloons paid for by donations to the Childline charity.

Bargains were the main order of the three days, and the cash flow across the counters was in continual spate much to the joy of the 200 exhibitors. Despite this, DTI staff who manned the small business stand reported reasonable numbers of people wanting to know more about their Enterprise Initiative schemes and the more serious exhibitors had their full share of interest.

Next year's event is scheduled for December 7 to 9 at Wembley Conference Centre.

"The new venue will allow us an increased capacity and we are currently looking into extending the hours and possibly increasing the number of days so that we can cater for up to 50,000 visitors", said head of Database Exhibitions, Michael Meakin

Signs of the times

WITH more than 7,000 software packages currently available for disabled users of Acorn machines, a new video has been produced underlining the importance of making information easily accessible to disabled people.

Aimed at the commercial world, it is the result of a collaboration between Acorn Computers and the DTI. The video can be obtained for £17.25 from Tripod Films, 111A Wardour Street, London W1V 3TD.

First public showing of the tape was by Acorn's health care specialist Krystyna Boughey during her talk to the fifth annual conference of the British Computer Society's Disabled Specialist Group.

Krystyna stressed the importance of providing for the disabled and to back this up her address was also delivered in sign language and large print with cassette and braille versions available for the blind.

Educational showcase

EDUCATIONAL software developers will be out in force at this year's BETT Show which takes place at The Barbican, London from January 17 to 19.

Among them will be Hybrid Technology (0223 420360) which will be showing a new BBC Micro music package aimed at the educational market.

The Music 5000 Universal is an add-on synthesiser module which adds stereo sound output to any standard BBC Micro music program replacing the internal sound without modification to program or computer. Now the new minimum entry level package in the Hybrid range, the Universal costs £113.85 plus £6 carriage.

Security key

CROWBOROUGH Instruments (0892 662078) has come up with a handy gadget for computer security. The Viewlock is a key-operated double pole switch which is connected in place of the existing mains plug. It disables the machine at the turn of a key and costs £22.42.

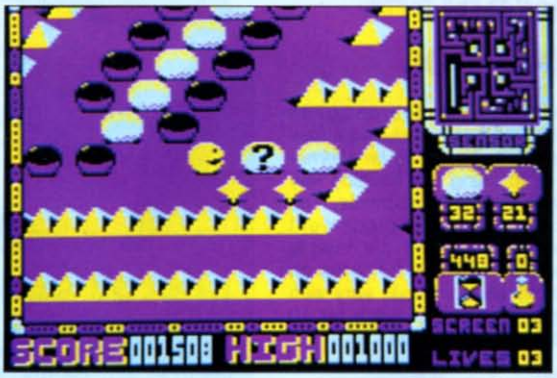
Our birthday treat

IN March The Micro User celebrates its seventh birthday and to mark the event readers will be given the chance to taste the high life.

Our next issue will feature a special birthday competition for which there will be three mouth-watering prizes.

Winners will be taught to drive in a Formula First racing car at the Oulton Park circuit in Cheshire, flying lessons in a light aircraft or the chance to own their own full-sized table football game as seen in many pubs and clubs.

These are offers not to be missed, so make sure of your March issue of *The Micro User*.



Sam makes it a dozen

SAM has made it to the 1990s with version 12 of the Play It Again series just out from Superior Software (0652 58585).

Sam 12 includes an updated version of the evergreen 20 level alligator game Blagger. Improvements include sound on/off and the ability to stay on the same level when all lives are lost.

Skirmish is second in line for Sam 12 – the classic jousting game from Delos D. Harriman. Top selling BBC Micro game of 1989 The Last Ninja is number three and completing the line-up is boxing simulation By Fair Means or Foul.

Usual Sam prices of £9.95 for cassette, £11.95 for 5.25in disc and £14.95 for Master compact.

Early in February, look out for Perplexity from Superior. Easiest description is a cross between Repton and Pacman.

The basic Pacman formula is combined with strategy and problem solving moving through 16 levels with four different backgrounds. The 3D levels get increasingly harder so beware the final ones. Same pricing as Sam.

BBC Micro owners who have been waiting for their own version of last year's eight bit hit Robo Cop could soon have it.

As *The Micro User* went to press Steve Hanson of Superior was in discussion with Ocean to produce a BBC Micro version of this favourite. When it comes it may be a bit more expensive than the usual Superior price.

Software firm goes solo

PREVIOUSLY a subsidiary of the Europress Group, Database Software (0625 878888) has now become an autonomous company.

Soaring sales have been given as the reason for this decision. Marketing manager Chris Payne takes over as managing director and sales manager Diane O'Brien becomes sales director.

The formation of Database Software Ltd, which embraces Database Software, Database Educational Software and Mandarin Software, is part of a corporate plan by Europress to allow group divisions to go it alone once the team involved has proved itself.

"The Database Software team has more than proved it can hold its own in the market", said Europress chairman Derek Meakin. "It has been responsible for a string of spectacular successes including STOS, the games creator and Fun School 2, easily the best selling educational package of all time".

Program helps builders

BUILDER Paul Baker has put his micro to good use by devising a program which slashes the time taken to prepare contract estimates.

What used to take him three hours can now be done in 20 minutes with the program which automatically costs materials when measurements are entered.

A simple questionnaire is filled in with basic measurements such as the length of foundations, length of drains, height of chimney and area of roof. These variables are entered into the program and the micro does the rest.

"All I do is write in the prices which are not worth programming and add it all up", said Paul. "As it's a tried and proven system I wonder if it would be of interest to other builders who do similar work.

"If they did not want to run it themselves, maybe they would be interested in filling in the questionnaire for their tender then sending it to me so I could run it through my program and send them a completed printout".

Paul's construction company employs 10 workers full time on one-off housing both under contract and speculatively, plus large extension projects. He can be contacted at 40 Dinmore, Bovingdon, Hemel Hempstead, Herts, HP3 0QW.

Is it possible?

A computer company offering both competitive prices and good support

BEEBUG thinks it is ....

Beebug is an appointed Acorn Premier Dealer and has been involved with Acorn computer equipment for over seven years. We have built our success on three important criteria:

Quality products, Competitive prices, Total support.

We apply this philosophy to all areas of our business. With Beebug you can rely on receiving a complete solution to all your computing needs.

Why is BEEBUG so different from other dealers ?

We have been experts on Acorn equipment for over seven years and have built up a reputation for offering a high level of support to our customers.

As the publishers of both Beebug and RISC User magazines we are aware of the latest developments and trends.

We listen carefully to our customers and stock the items that they require. Because we have confidence in our product range we buy large quantities and therefore can pass the discounts on.

New products are thoroughly investigated before they are added to our range so you can rest assured of the quality.

Our knowledgeable and friendly staff are able to offer you unbiased advice on the best equipment to meet your requirements. Buying the wrong equipment can be a frustrating and expensive experience which we can help you to avoid.

We offer a range of credit facilities including 0% finance on all Archimedes and the Master 128.

On average over 80% of orders are dispatched within 24 hours of the order being received and if the item is out of stock you will be immediately notified.

All orders are now keyed directly into our new networked mail order computer. This ensures that your order will be processed efficiently and speedily, and enables us to instantly give you up to date information should you have a query about your order.

We have a large showroom based in St Albans where personal visitors are very welcome to try out the latest equipment and software.

After you have made a purchase from Beebug, we do not lose interest. If you have a query on a purchase you can phone our technical hotline and speak to one of our technical advisors who will do their best to help you.

In the unlikely event that an item develops a fault we have our own engineering department, with a speedy turnaround.

Beebug is the only dealer to offer FREE On-Site Maintenance on all Archimedes computers sold in the UK.

Call 0727 40303 and ask for a copy of our FREE information pack. This includes a copy of our new 40 page retail catalogue and details about the Beebug and RISC User Magazines. Alternatively, write to the address below.

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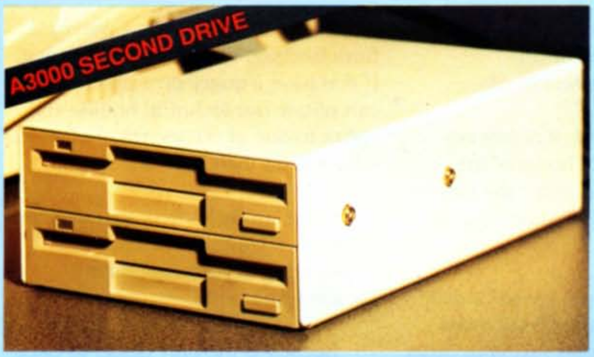
MORLEY ELECTRONICS

ARCHIMEDES

THE WORLDS MOST POWERFUL MICRO

A3000	£649	410/1	£1199
310	£899	420/1	£1699
310M	£959	440/1	£2499

SPECIAL OFFER UNTIL JANUARY 1990 BUY AN A3000 OR ACORNS DESKTOP PUBLISHER AND SAVE 20% OFF THE COST OF A MORLEY RAM BOARD



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- ☐ Easy to install simply plug in and run
- ☐ High quality Japanese Drive
- ☐ Includes full fitting kit and instructions

Dual Drive Kit **£125**

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64k Printer Buffer	£115	Eprom Eraser	£18
256k Printer buffer	£199	Eraser with timer	£23

(NOTE switching units & print buffers come with printer lead)

The Morley TELETEXT ADAPTER is now available for the Archimedes. The specification including screen dumps etc., is the same as the BBC version but connection is via a Podule socket. £125

EXISTING USERS OF OUR BBC TELETEXT ADAPTER
WE CAN UPGRADE THE UNIT FOR THE ARCHIMEDES FOR £35

RING FOR DETAILS

We are now an Acorn dealer and service centre. If you would like to have a look at the A3000 or any other Acorn/Morley products please feel free to call in and discuss your requirements with our staff.

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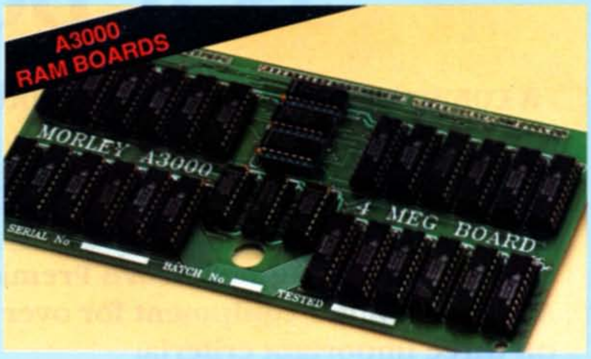
Morley Module Podule

Allows frequently required 'Modules' to be loaded into a non-volatile storage area on the podule. Thus saving the tedium of searching through your discs for the modules required.



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- ☐ Make full use of Acorn's powerful Desk-Top Publishing package
- ☐ 1 Meg upgrade gives you a total of 2 Meg on-board
- ☐ 1 Meg board upgradeable to 3 Meg

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3 Meg Upgrade	£415
1 Meg to 3 Meg	£298
305 1/2 Meg	£105
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A3000		4 Slot Backplane	£59
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User port & MIDI Podule	£49	Midi Podule	£65
Serial Upgrade	£19	20 Meg Hard Disc & Controller	£465
Econet Upgrade	£49		
Pipedream 3	£147	Acorn DeskTop Pub.	£149
Risc Os Companion	£49	Clares Pro Artisan	£145
1st Word +	£69	Clares Artisan	£29
Autodesk CAD	£79	Clares Toolkit	£34
Acorn PC Emulator	£99	Clares Toolkit +	£43

A3000 5.25" SECOND DRIVE
MORLEY

Kit includes: 5.25" Teac 80 track drive; case; power supply; 3.5" drive cradle; interface and leads **£169**

A3000 SCSI PODULE £149

A3000 WINCHESTERS

Including SCSI Podule, drive, case and leads

20 meg	**£465**	30 meg	**£495**
40 meg	**£575**	60-200 meg POA	

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CARRIAGE: £1 on all orders. £3 on larger items (adapters).
VAT: UK customers please add 15% to cost incl. carriage.
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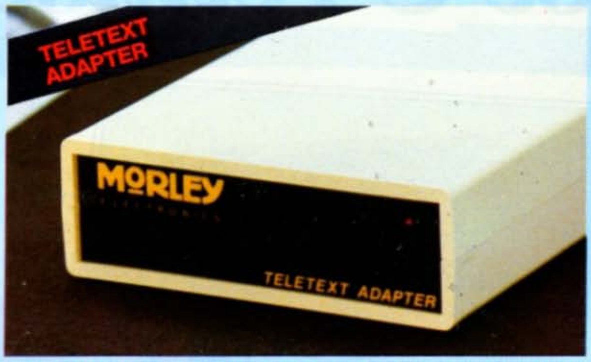

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BBC/Master	**£104**
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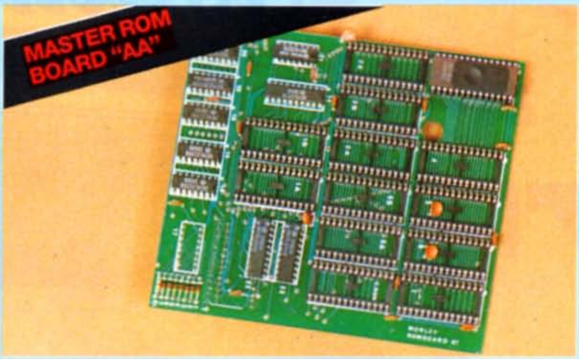

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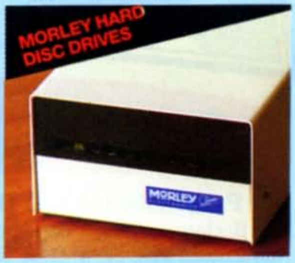

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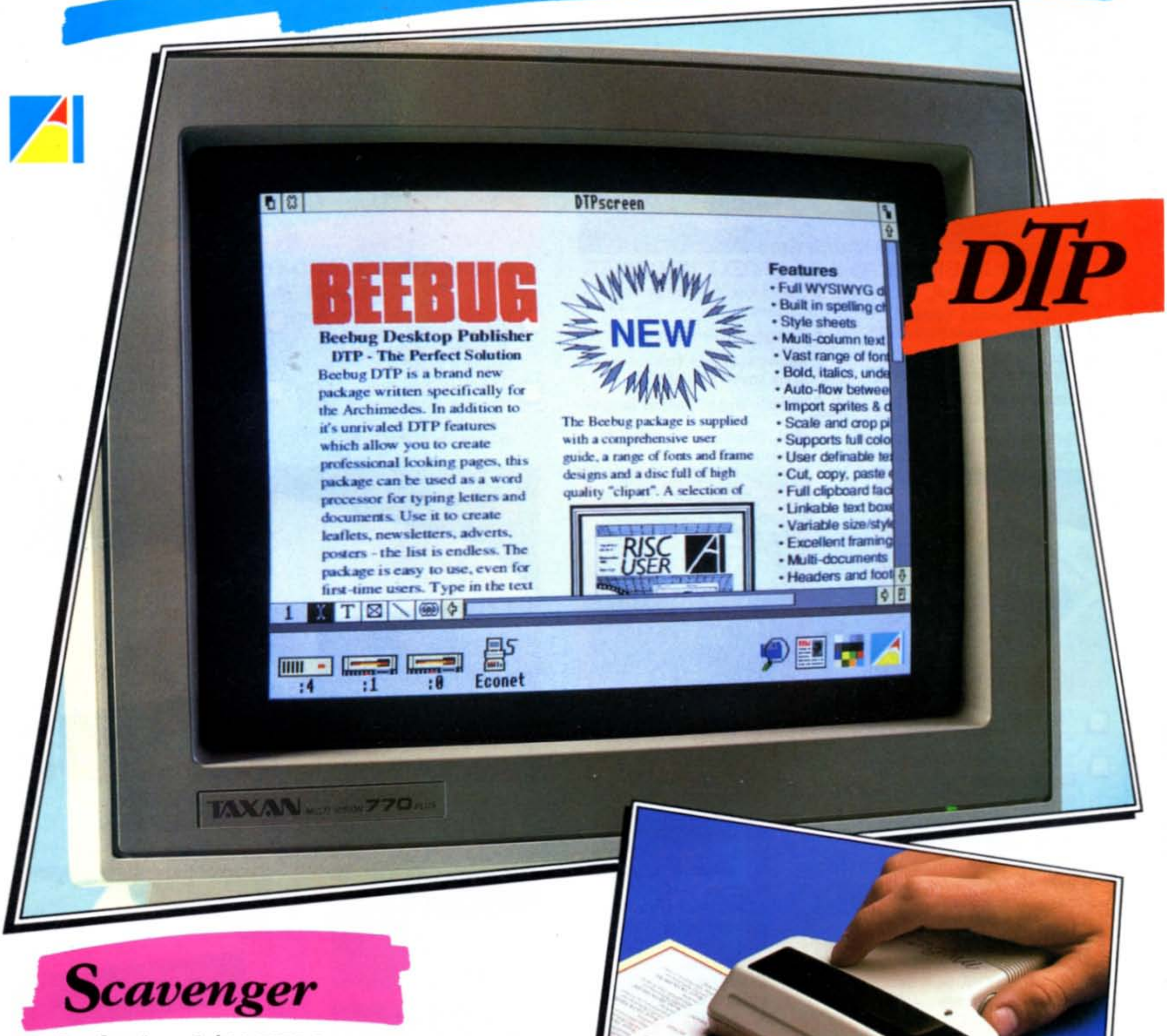
Visualise & realise,

DTP



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DTP - The Perfect Solution

Beebug DTP is a brand new package written specifically for the Archimedes. In addition to it's unrivaled DTP features which allow you to create professional looking pages, this package can be used as a word processor for typing letters and documents. Use it to create leaflets, newsletters, adverts, posters - the list is endless. The package is easy to use, even for first-time users. Type in the text

NEW

The Beebug package is supplied with a comprehensive user guide, a range of fonts and frame designs and a disc full of high quality "clipart". A selection of

Features

- Full WYSIWYG d
- Built in spelling c
- Style sheets
- Multi-column text
- Vast range of fon
- Bold, italics, unde
- Auto-flow betwee
- Import sprites & d
- Scale and crop p
- Supports full colo
- User definable te
- Cut, copy, paste
- Full clipboard fac
- Linkable text box
- Variable size/styl
- Excellent framing
- Multi-documents
- Headers and foot

Scavenger

Professional 400 DPI Scanner

The Beebug Scavenger hand-held image scanner for the Archimedes adds life to DTP, Word Processing, Drawing and Painting, by enabling the incorporation of photographs and drawings into documents. The 105mm wide scanner features **true** 400 DPI resolution unlike most other hand-scanners currently available, where the 400 DPI is hardware generated from 200 DPI.

As you scan, the WIMP-based software supplied on the podule, displays images on the screen in real-time. Once scanned, these images can be cropped, scaled, flipped, converted into grey shades (to enhance photographs), transferred directly into other RISC OS applications such as DPT, ArcPaint and ArcDraw, or saved in a special compressed format to make the best use of disc space.

The package includes Scanner, half-width podule, built-in ROM software and a comprehensive user guide.

Price £173.04+VAT+£7 Carriage

SCAVENGER A4

A full A4 width 200 DPI scanner is also available with half-width podule, built-in ROM software and user guide.

Price £346.96+VAT+£7 Carriage

A4 Sheet feeder for SCAVENGER A4
Price £146.96+VAT+£7 Carriage

DTP + *Scavenger,* HARD DISC *Companion* + *Hearsay,* NOW *from* BEEBUG

Beebug Desktop Publisher – The Perfect Solution

Beebug DTP is a brand new package written specifically for the Archimedes. It has unrivalled DTP features which allow creation of professional looking pages for leaflets, newsletters, adverts, posters or use it as a word processor for typing letters and documents. The package is easy to operate, even for first-time users. Type in the text, specify the font, style and size, add headlines, import and scale pictures, move items to their final positions; the page you are creating is shown on the screen exactly as it will look when printed.

The Beebug DTP package is supplied with a comprehensive user guide, a selection of example documents, a range of fonts and frame designs, and a disc full of high quality 'clipart'.

- Full WYSIWYG display
- Built-in spelling checker
- Style sheets
- Multi-column text
- Vast range of font sizes
- Bold, italics, underline etc.
- Auto-flow between pages
- Import sprites & draw files
- Scale and crop pictures
- Supports full colours
- User definable text styles
- Cut, copy, paste etc.
- Full clipboard facilities
- Linkable text boxes
- Variable size/style lines
- Excellent framing facilities
- Multi-documents
- Headers and footers
- Powerful search & replace
- Uses Acorn printer drivers

Price £129 + VAT + £3 Carriage

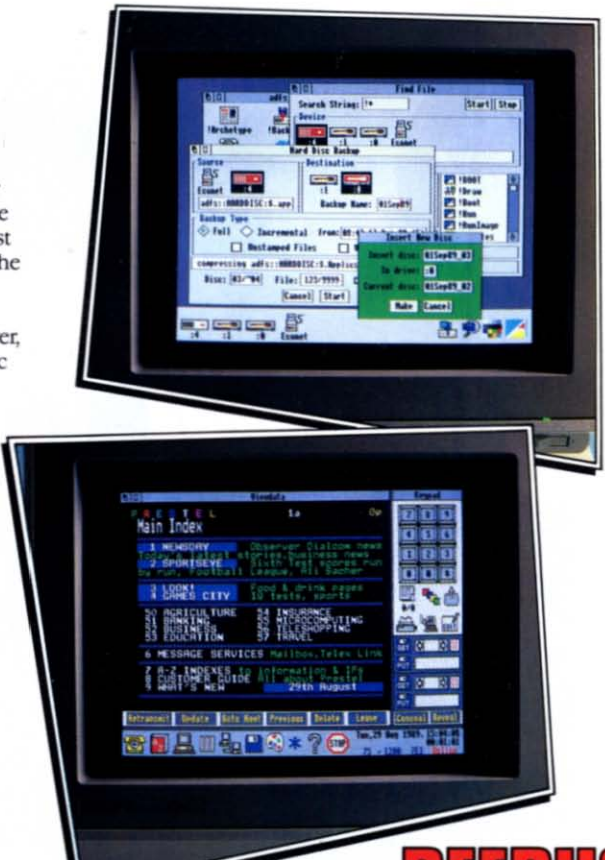
Available late 1989. Please write or phone for specification.

HARD DISC *Companion*

Essential Hard Disc Utilities

Hard Disc Companion contains an easy-to-use and reliable **'Backup'** facility which allows the contents of the hard disc or network to be saved onto floppy discs. Two types of backup are possible; **'Full'** saves every file on the hard disc to floppy, whilst **'Incremental'** saves only those files added or changed since the last backup. **'Restore'** is equally comprehensive allowing full, partial, or file-by-file restore from floppy disc. Hard Disc Companion also contains **'Spark'**, a file compressor and archiver, and **'Find File'**, a fast easy-to-use utility for locating files on disc or network.

Price £33.91 + VAT + £2 Carriage


Find File
Search String:
Start
Stop
Device
Econet
Hard Disc Backup
Source
Destination
Backup Name:
Backup Type
Full
Incremental
From:
Unstamped Files
Disc:
File:
Cancel
Start
Insert New Disc
Insert disc:
In drive:
Current disc:
Make
Cancel
!Archetype
!Boot
!Draw
!Run
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57 TRAVEL
6 MESSAGE SERVICES Mailbox,Telex Link
7 A-Z INDEXES to information & IPs
8 CUSTOMER GUIDE All about Prestel
9 WHAT'S NEW
29th August
Update
Previous
Delete
Conceal
Reveal

Hearsay

The Definitive Communications Package

This exciting mouse-driven package takes communications on the Archimedes into a new league. It is ideal for use with Prestel, Telecom Gold and bulletin boards, and no technical knowledge is necessary. **'Hearsay'** provides extensive emulations of all the terminals you should ever need, including: VT220, VT102, Prestel, Tektronix and TTNS. File transfer protocols provided include: XMODEM, YMODEM, SeaLink, Kermit and ASCII. Other features include: telephone directory, call logger, capture buffer, viewdata editor, and line editor. **'Hearsay'** works with virtually all modems including Hayes and DTI. Modem leads are available for most makes of modems – please phone for details.

Price £60 + VAT + £3 Carriage

All details within this advertisement are subject to alteration due to continuing development and improvements.

All products require RISC OS and at least 1 MByte of RAM.

Beebug Limited BEEBUG
117 Hatfield Road, St. Albans, Hertfordshire, AL1 4JS
(0727) 40303 FAX (0727) 60263

B B+

Spot the birdie

A unique micro golf game from Jon Perry and Pali Rao

THERE are several implementations on the BBC Micro for that ancient and extremely skillful game but here's a unique one which lets you design your own golf holes and courses. The software is in two parts – the designer and the course.

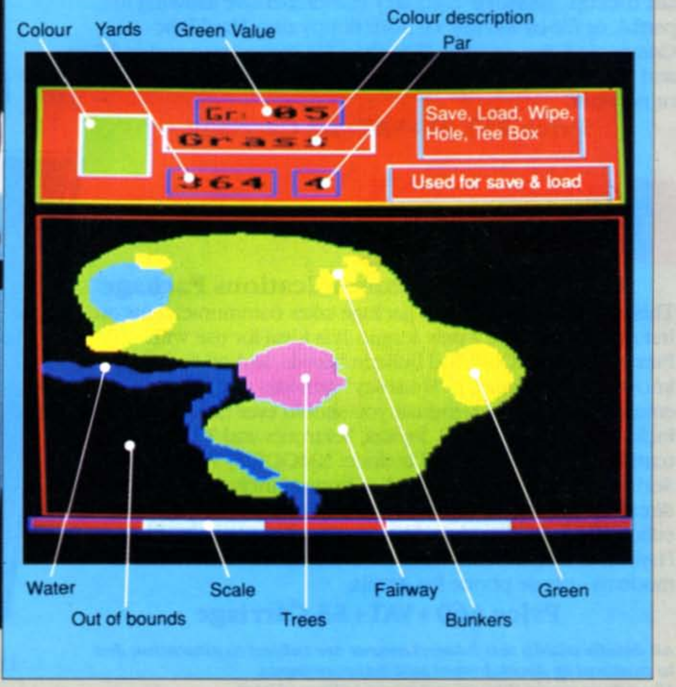
Type each in, using Get it Right! to ensure you have copied them exactly as printed. The system is designed for disc but could easily be adapted for tape although the holes would take a long time to load.

Before moving on to the course you must first design some holes. Their variety is unlimited, but as there no restraints on what can be done – to allow full creativity – take care not to design impossible screens such as ones with two greens or an unhittable distance over some obstacle.

Use the keys shown in the panel to design a hole. Note that to decide par it is best to use the standard golfing convention – par equals number of strokes needed to get to the green and two more for putting.

After designing a hole save it before moving on to the course program. You are first asked if you are sure, and then told to position the hole and tee. The hole can, predictably, only be placed on the green and the tee must be on the fairway.

The program then saves all the necessary details about your hole in two files; when loading the filename you use the one without the @ sign. When you play the game you are given an option to either play a hole or complete a 9 hole course. To do this, save your holes with a number suffix of 1 to 9 – for example GOLF1, GOLF2 and so on. Then just use the filename



Guide to the Designer Screen

GOLF when you want to play the course.

So, now you have designed some holes you're ready to play. But first you need a small understanding of golf and its adaptation to this program. The game itself was described in our November 1989 issue, so let's look at how it is implemented here.

The ball can be hit with any of 14 clubs, which include woods, irons, sand wedges, pitching wedges and a putter which is only used on the green. There is a lot of information on screen necessary to complete the hole. It's all self explanatory – note that the base scale shows blocks with each representing 75 yards.

To play a hole, first choose a club and direction using the keys shown, and then decide the strength of the stroke. In normal play this may vary from 100 to 30 per cent, but when you're in a bunker it has an upper limit of 60 per cent.

Next comes the test of skill which judges how straight and how hard the ball is hit. To do this you have to stop the moving indicators by pressing the spacebar – first for the straightness then for the strength. The ball then moves and the process is repeated from the new position until the ball lands on the green.

There the screen is basically the same, except that the description of the clubs is replaced by a description of the green – from 0 to 9. Also shown is the distance remaining to the hole.

To play a shot on the green just stop the moving lines where required, again using the spacebar. The first line now tests the accuracy of the shot – not necessarily to the left or right of the hole – and the second determines its strength – a perfectly hit one should be slightly above the centre line.

Afterwards you see your scoresheet indicating the number of strokes you took, and the total number of strokes necessary.

Course colours

Black areas are out of bounds – as a ball enters it stops dead. The ball may then be played over the black and back on to the course.

Green represents the fairway, the only safe place, except the green, to make the ball land.

Yellow shows sand bunkers which can be safely hit over but if you land in one you can only cover a short distance with each shot.

Blue areas are water, which again may safely be hit over, but balls falling in are placed back at the spot where they first enter the water's air space.

Magenta shows trees which, like water, must be completely passed or the ball is sent back. Trees must be passed at a reasonable height.

Cyan represents the green, and when the ball lands in the area the program branches to a separate routine.

Keys for the designer

Normal mode

Z,X,:,/	Move cursor
Shift	Increase cursor speed
Cursor Up	Increase yards to 910
Cursor Down	Decrease yards to 130
Cursor Left	Decrease yards
Cursor Right	Increase yards
Control + W	Wipe in current colour
3,4,5,6	Change par

S	Decrease green value
F	Increase green value
f0	Exit spray or circle mode
f1	Spray in current colour
f2	Draw a filled ellipse in current colour
f3	Decrease colour
f4	Increase colour
f6	Save hole
f8	Load hole

Ellipse mode

Cursor keys	Change dimensions
Spacebar	Create perfect circle
Shift	Increase speed
Return	Draw ellipse

Ready-designed courses

Together with the game and designer, subscribers will find a nine hole course on this month's disc. The game will be repeated for the next two months, together with two more courses. Details of subscriptions are on page 129.

If you don't subscribe, copies of the game and courses are available by sending formatted 5.25in discs (one for each course) to Jon Perry, 19 Elmore Close, Holmes Chapel, Cheshire, CW4 7HW. Three courses are available at £2 each, or £5 for all three. Please include stamped return packaging.

Turn to Page 120 ▶

Keys for the course

Normal Play

Z,X,:,/
Change direction

Cursor L or R
Change club

Return
Confirm direction and club

Cursor U or D
Change strength

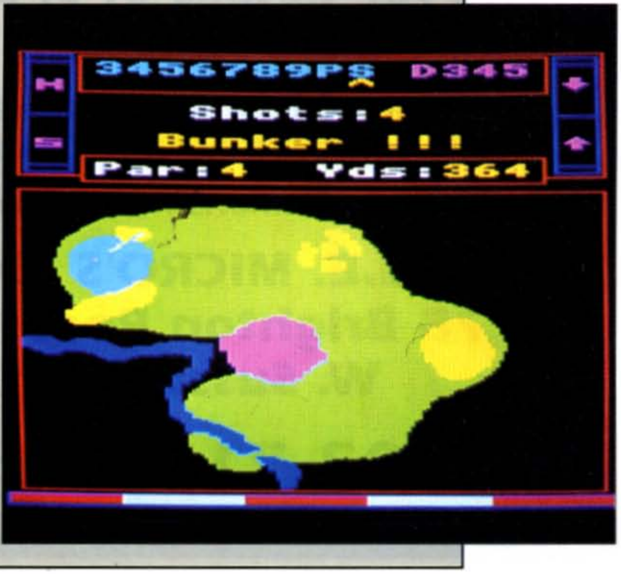
Copy
Confirm strength

Spacebar
Decide straightness or strength

On green

Spacebar
Decide angle or strength

Teeing off



3456789PS D345

Shots:4

Bunker !!!

Par:4 Yds:364

A3000
Memory expansion now available
2nd Mb £172 inc VAT
User fittable

2 & 4 MB Ram Expansion For The Archimedes 310

CJE Micro's 320/340 RAM expansion board provides the ideal upgrade path for Archimedes 310 owners. The board can be supplied with 1MB fitted giving 2MB total or 3MB fitted giving 4MB total. The 1MB board can have 2MB more RAM fitted at any time. The extra memory is functionally the same as a 400 series.

Available Now

Professional fitting is required, so collection, fitting and return of your computer is included in the price.

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Prices include VAT

Please phone to book your upgrade fitting.

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U·P·D·A·T·E

Page designing for youngsters

PRINTBOX, the latest product from educational software house Logotron (0223 323656). It's a child-centered page design program which allows even the youngest children to mix text and pictures on screen.

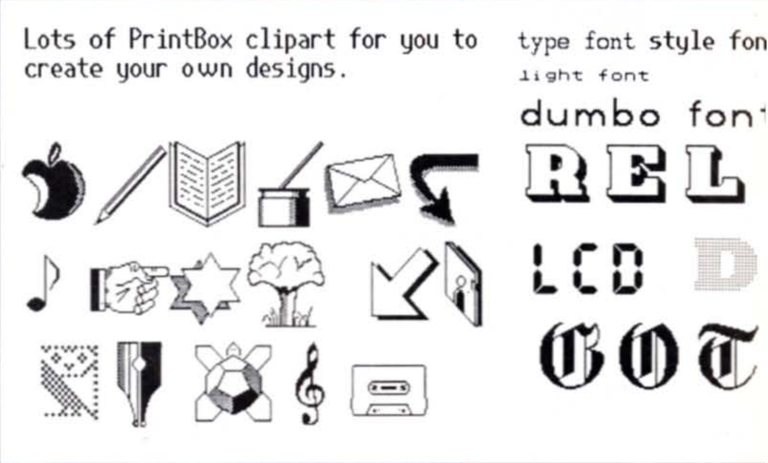
Youngsters can design mono or colour posters, greetings cards, stationery, newsletters and booklets using the package which was designed by Peter Hunter, the author of PenDown, Logotron's popular word processor for children. PrintBox complements PenDown. All the PenDown fonts or type faces are available to PrintBox users and letters can be seen on screen just as they appear on paper.

As well as working with PenDown, PrintBox is a page design tool in its own right. The screen capture feature allows users to grab screens from other programs while they are running then paste them into a PrintBox document. The package comes with a ready-made library of fonts, pictures and clip-art which means that children can start to use the program immediately, producing surprisingly professional results. Tools are also provided to allow users to create their own fonts.

This latest product has been designed for use on the BBC Model B and Master series and comes with a vote of confidence in the future of those machines.

"Although a good deal of excitement now focuses on newer and more powerful micros, most primary schools still regard the original BBC Micro as their workhorse", says publisher Christopher Roper in an open letter to teachers. "If you are among them we haven't forgotten you and we don't see why you shouldn't share the excitement. There's still plenty to be done to exploit the full potential of the BBC Micro whether you have a Model B or a Master".

PrintBox costs £30.47 which includes £2.50 postage and packing.



Lots of PrintBox clipart for you to create your own designs.

type font style fon

light font

dumbo fon

REL

LCD

GOT

Concept keyboards for the Archimedes

CONCEPT keyboards can now be used with Archimedes machines and Acorn's A3000 thanks to an upgrade of Touch Explorer Plus software from the Concept Keyboard Company (0962 843322). Recently rewritten and updated specifically for Archimedes and A3000, the software has been designed to make full use of 32 bit technology.

Touch Explorer Plus has become virtually an education standard during the 12 months it has been available for BBC Micros. It offers wide teaching applications when teamed with the Concept Keyboard for early primary to mid-secondary ages.

Although it is an extremely complex and sophisticated package, Touch Explorer Plus needs no special knowledge on the teacher's part and is now even faster with more options thanks to the greater power of Archimedes and A3000 micros. It will be distributed direct by the Concept Keyboard Company through its Winchester-based offices.

Concept Keyboards allow up to five children to use one micro so offering a cost-effective way

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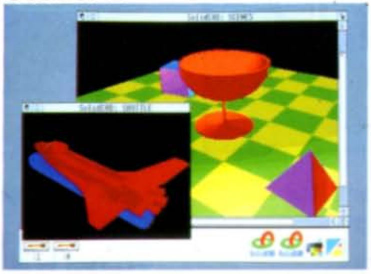
Touch Explorer, now in 32 bit version too

SILICON VISION

SOFTWARE FOR THE ARCHIMEDES COMPUTER SYSTEM

SolidCAD



The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity.

£99.95 (ARC) New

SolidsRENDER

The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations taking into account multiple light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer uses sophisticated colour mixing techniques to provide the maximum range of colour shades plus anti-aliasing for smooth edges, motion blur effects, dynamic viewpoint, variable camera lens for wide angle and telephoto effects and multi-colour light sources driving the Archimedes display hardware to its limits for the best photo-realistic images within the laws of optical physics.

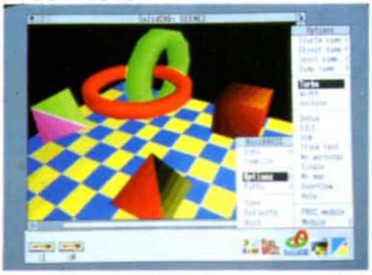
£79.95 (ARC) New

SolidTOOLS

The fully integrated environment for 3D CAD, Animation, Rendering & Hardcopy. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your 3D Design and Presentation requirements.

£275.00 (ARC) New

RiscBASIC



The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.

"Still the only true BASIC V syntax compiler. If you want the best, buy Silicon Vision's complete answer"
- Micronet August 1989.

£99.95 (ARC) New

GerberPlot

The complete Gerber driver for ARC-PCB and ARC-PCB Professional Printed Circuit Board design packages producing Gerber plotfiles for driving Electro-static Photo-plotters. These plotfiles may be sent directly to photoplotter bureaus on Archimedes ADFS or MSDOS disc formats to produce the highest quality PCB artwork for professional results.

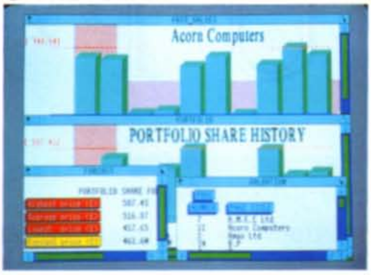
£125.00 (ARC) New

SuperPlot

The complete plotter driver for SolidCAD, Realtime Solids Modeller and Gate-Array Design System supporting the industry standard HP-GL, Graphtec, Watanabe and Plotmate plotters.

£29.95 (ARC) New

ShareHolder



The complete share holder's management system providing all the facilities needed to automate your portfolio. Features include Company statistics, Share holdings, Transaction processing, Portfolio history, Forecasts, Dividends due, Share price updates plus built-in Calendar, Calculator and Hardcopy facilities for total integration.

£99.95 (ARC) New

DataVision

A full featured relational database management system which also includes word processing, label printing, reporting, & mail-merging facilities in one integrated environment for the Archimedes, bringing professional quality business software to the demanding user. The database manager is rich in features and includes facilities for the production of complex queries, detailed reports, browsing, sophisticated relational data entry, relational reporting, interactive & global editing, formula entry and validation. All this in an intuitive easy to use mouse driven environment.

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Financial Accountant

The professional business accounting and database package which includes DataVision together with turnkey applications for Order Processing, Invoicing, Sales ledger, Purchase ledger, Cash book, Stock management, Reporting, VAT returns plus year-end accounting complete in one integrated environment.

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of introducing children to computer technology. As *The Micro User* went to press, the price of Touch Explorer Plus was still to be fixed.

Teddies get a bright new look

TOP selling educational package Fun School 2 is now available in an Archimedes version using the 256-colour Mode 13 including music and digitised pictures which have been improved from the 8 bit BBC Micro version. Even the teddies have a new look, being taken from the official Archimedes teddy sporting the Archie tee shirt.

From Database Software (0625 878888), Fun School 2 was designed by teachers to combine entertainment with a wide range of early skills. It includes three age defined sections for under sixes, six to eight year-olds and the over eights. A suite of eight programs is available for the youngest age group. Counting teddies, spelling and guessing games improve childrens' numeracy, literacy and concentration.

For the six to eight-year-olds, programs are devised to provide various levels of difficulty from word and number to coordination and logical thinking. Older children have to solve seven challenging games and use the resulting passwords to solve the eighth program.

The Archimedes version of Fun School 2 costs £19.95.

Alarm wins prize for schoolboy, 14

A SCHOOLBOY'S interest in computers has won him first prize in the 1989 Schools Design Prize competition organised by the Design Council. Andrew Bardsley, 14, a pupil at Burnage High School, Manchester, scooped his award in the 11 to 14-year-old category of the competition with his design of a security device for micros.

He received £150 for himself and £200 for his school from Secretary of State for Education and Science John MacGregor at a ceremony in The Design Centre, London.

Andrew developed his vibration sensor alarm for a school craft, design and technology project on leisure and security. It fits into all makes of micros and will detect any movement or unauthorised use emitting a loud warning sound. Cheap to make, it is self-powered and easily detached when not in use. It can also be modified to fit other electrical equipment and can act as a software security device or as an alarm loop for several machines.

"I have been interested in micros for years, since primary school, and I use mine mainly for games and programming, especially graphics", said Andrew. "I like making electronic things at home. I have made a random number generator and for me the best part of the project was making the alarm. It fitted in with my hobby".

The win brought praise from Andrew's teacher, head of the design & technology faculty Peter Davies. "It was extremely well thought-out and executed, quite the best third year project I have seen and as such it merits special support from the school", he said.

MicroGuard
Detects Movement
Efficient and compact
Colour Coordinated
Powerful Deterrent
MicroGuard

Micro Guard: Winner of the 1989 Schools Design Prize

The Schools Design Prize judges were also impressed with the level of electronic competence, Andrew's extensive research and with his ability to develop a full working model from his design. But Andrew's work did not finish with the design. Marketing was also considered and he produced a logo of a computer disc incorporated into a padlock.

The Schools Design Prize aims to promote and develop design education at secondary level. This year it attracted more than 400 entries.

New resources for computer control

LEGO Dacta (0978 290900) has launched a new set of resource materials to allow teachers and pupils make more innovative use of its computer control sets. Called Ideas for Communication and Control, they are designed for pupils aged 13 to 16.

The resource materials include a teacher's guide, activity cards, inventor's handbook and disc. The 50 activity cards progress from simple systems to more open ended design briefs and suggested activities include controlling X-Y plotters, reading bar codes, communication via fibre-optic cables, data collection, data handling and measuring speed and acceleration.

Contained in the teacher's guide are comments and possible solutions for all activity cards, reference guide to the software and Lego materials as well as ideas for extension work and projects. The disc contains the new TC-Controller software as well as a user friendly data collection and handling software.

TC-Controller software contains a number of powerful commands for turning on/off outputs, controlling speed of motors, reading inputs, counting, timing and a direct control special

➤

Building for the future: Pupils in control with Lego

➤

mode facility. Lego Dacta products are sold only through education distributors. The new resource set for BBC Micros costs between £70 and £80 depending on distributor. A Lego Dacta interface unit costs from £100 to £125.

Tots to tackle the keyboards?

FIVE-year-olds could soon be doing computer work in school if recommendations of the National Curriculum Council are implemented by the government.

The importance of early computer learning is stressed but the NCC report also lays emphasis on computers being integrated with other subjects rather than being in isolation. It promotes the idea of the subject being split between Design and Technology and Information Technology running through from five-year-olds to secondary school.

In the foreword to its report, the NCC states: "Business and industry need young people who have the vision to combine enterprise, initiative and imagination with knowledge and skills to solve problems and create the nation's wealth. If this need cannot be met, then our national development in these areas will not prosper, a failing which will have dire consequences for our whole future.

The present proposals specify an educational programme to enable pupils to meet this need and the council believe that their succesful implementation is vital to the future of this country".

Reader offers Reader offers

Have FULL control of the data you receive with this teletext adapter

With the Morley Teletext Adapter you'll be joining the 3.5 million households who regularly access the thousands of pages on Ceefax, Oracle and 4-Tel to check programme details, holiday information, weather, up-to-the-minute news bulletins and much more.

AND you'll have far more flexibility than if you use a normal TV set – you can store or print pages and program your BBC Micro to evaluate the data for you. While you're watching your favourite TV programme your micro can be printing a review of a film to be screened later, checking your personal share portfolio or even checking whether you've won the pools.

The Morley Teletext Adapter is the most popular unit on the market with more than 10,000 satisfied customers – including the Department of Transport who use it to display weather maps at service stations throughout the country. It plugs straight into the user port, includes menu-driven software and automatically tunes itself to the required channel.

You'll be able to store pages in memory, use the real-time clock in your programs and automatically load associated pages each time you select a page from the menu – considerably speeding up access time.

The Morley Teletext Adapter is an ideal companion for your BBC Micro system.

Note: If you use your BBC Micro's auxilliary power socket for your disc drive, or any other external device, you will need a power supply which we can provide for an additional £9.95.

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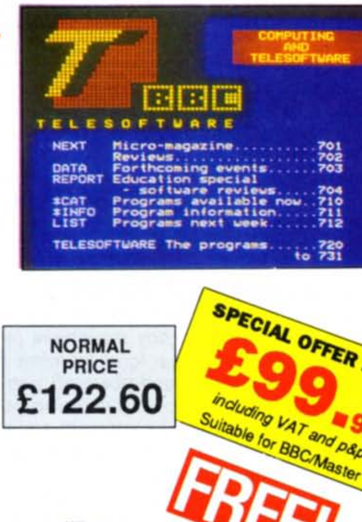
IMPORTANT: The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting. They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service during office hours on 01-927 5040.



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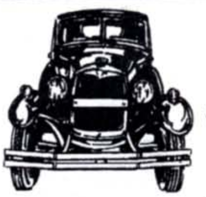

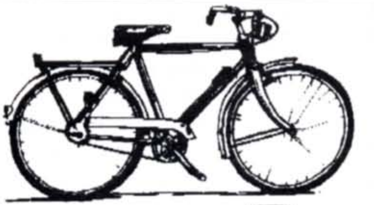

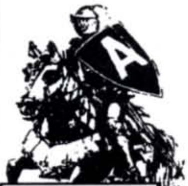

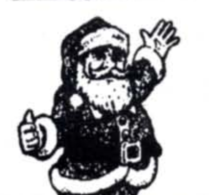

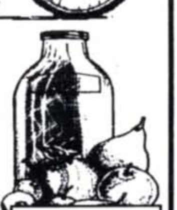

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Taking graphs by the tail

Ian Whitmore examines a versatile plotting package

MOUSE plotter is a graph plotting program, supplied in a plastic wallet on a single 640k disc – less than half full – with a high quality 88 page manual. As suggested by the supplier's name, it is an educational maths package aimed at schools and colleges. Suitable for use on a 1Mb Archimedes, it reconfigures your machine when booted, saving your configuration on the disc and reloading it when you quit.

If you drop out of the program by some other route you can reboot and quit to get your original configuration back. Under Risc OS you have to be careful to have the correct drive selected or it gets lost.

The instructions suggest that you try the program before reading the manual, as the program is so intuitive and has such good on screen help. I did find the software easy to get into and, in any case, the manual is more of a work and trouble-shooting guide.

After booting, the screen clears and three sections are shown. Top right is the card area, bottom right the menu icons and the rest of the screen is composed of one or four graph boxes. Using the mouse – all three buttons have the same action in Mouse Plotter – the top card is dragged into a graph box and the program draws the appropriate graph with its own choice of x and y axes.

You can enter any formula on a blank card in a number of different formats, for example:

- y=f(x)
- y2=f(x)
- Parametric form, x=f(t) and y=f(t)
- Polar equations, r=f(t)
- Implicit linear equations

Superscripted numbers are available from the function keys with *pi* and *e* from f11 and f12. Figure I shows four functions drawn from a stack of cards.

In addition Mouse Plotter can draw graphs from data files acquired by other software, such as Quest, Inform, Grass, Function Graph Plotter and System Delta Plus. Figure II shows a file from Inform which is on the Mouse Plotter disc and contains personal data about pupils in the first three years of a comprehensive school.

Product: Mouse Plotter
Price: £20
Supplier: The Shell Centre for Mathematical Education, University of Nottingham, Nottingham NG7 2RD
Tel: 0602 484848

When you choose a file to load for display you are offered all the various linked data lists AND select which are to be displayed on the x and y axes. Beebug Zoom files can also be loaded and drawn.

The 16 menu icons – Figure I – allow zoom enlargement, dragging the window to view undisplayed areas and x2 and x10 reduction. You can redraw a graph, alter the values for the axes, choose between one and four graph boxes and bring an alternative submenu of icons into view (see Figure III).

An icon with an arrow and an equal sign

➤

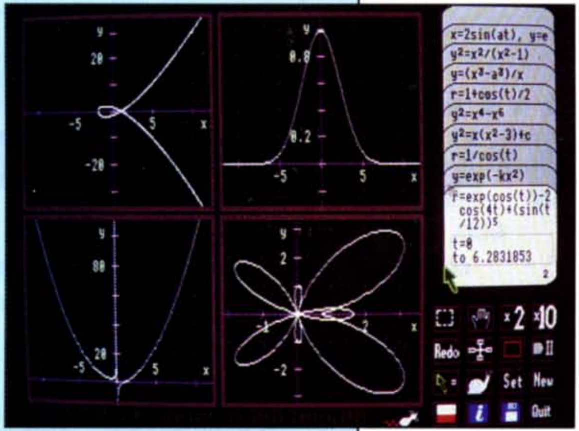
y
20
-5
5
x
-20
y
0.8
0.2
-5
5
x
y
80
20
-5
5
x
y
2
-2
x
x=2sin(at), y=e
y²=x²/(x²-1)
y=(x³-a³)/x
r=1+cos(t)/2
y²=x⁴-x⁶
y²=x(x²-3)+c
r=1/cos(t)
y=exp(-kx²)
r=exp(cos(t))-2 cos(4t)+(sin(t/12))⁵
t=0
to 6.2831853
2
×2
×10
Redo
Set
New
Quit

Figure I: Four graphs displayed from the cards in the upper right corner of the screen

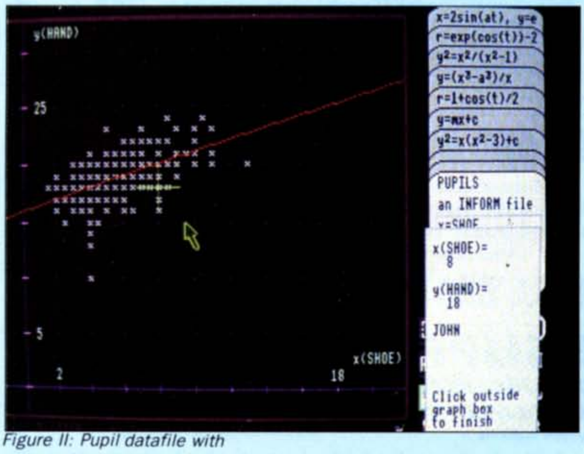
y(HAND)
25
5
2
18
x(SHOE)
x=2sin(at), y=e
r=exp(cos(t))-2
y²=x²/(x²-1)
y=(x³-a³)/x
r=1+cos(t)/2
y=mx+c
y²=x(x²-3)+c
PUPILS
an INFORM file
x=SHOE
x(SHOE)=
8
y(HAND)=
18
JOHN
Click outside graph box to finish

Figure II: Pupil datafile with point selected on graph

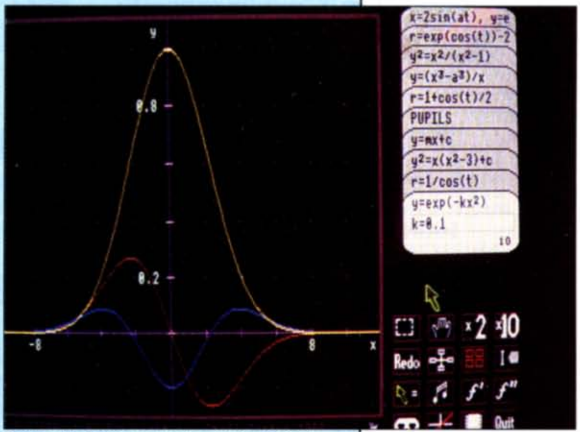
y
0.8
0.2
-8
8
x
x=2sin(at), y=e
r=exp(cos(t))-2
y²=x²/(x²-1)
y=(x³-a³)/x
r=1+cos(t)/2
PUPILS
y=mx+c
y²=x(x²-3)+c
r=1/cos(t)
y=exp(-kx²)
k=0.1
10
×2
×10
Redo
f'
f"
Quit

Figure III: Primary graph with both first and second derivatives displayed

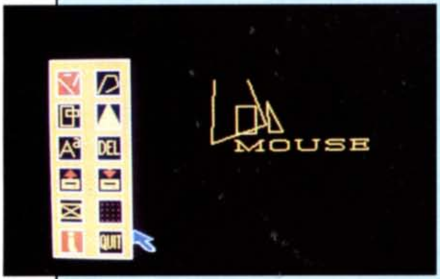

Figure IV: The Wooz drawing package

◄ enables you to read a value directly from the graph, giving its coordinates and the name of the point if from one of the imported data files (see Figure II). Slow plotting, new and quit follow their usual functions, while the disc icon allows files to be loaded.

The information icon displays a number of Help screens which make the manual almost superfluous. The colour icon selects the colours for display while the set icon accesses the settings for colours for plotting, axes and labels. A submenu – other settings – allows you to choose the letters for variables, whether angles will be in degrees or radians and the password system.

Here you can also save all the files in Mouse Plotter and their settings as a Mouse Plotter file. Several example are on the disc.

The submenu of icons – Figure III – has some less commonly used functions. The axes of the graph and the data on the cards can be hidden and the screen printed on an Epson-compatible printer. The music icon allows you to listen to a function while it is plotted while f' and f'' plot its first and second derivatives.

Should you be lucky enough to have an analogue port expansion card a further icon allows data to be taken directly from the outside world. Error checking is quite extensive, showing a red pop-up window with the error message. It can also analyse the syntax of formula entry.

Also on the disc are two additional packages, Wooz and Filemaker. Wooz is a simple drawing package that creates Beebug Zoom files – Figure IV – using straight lines and text. Filemaker creates and edits Function Graph Plotter data files.

Overall Mouse Plotter is very easy to use even without the manual and a very powerful utility.

Summing up

The quality of display is very classy and the Mouse Plotter works with the usual Archimedes speed. This is a very good educational package providing a wide range of graph plotting facilities at a very reasonable price.

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First choice

Rog Frost puts a versatile piece of software to the test

Product: Nutrition and Catering Science – Multiple Choice Quiz
Price: £15.00
Supplier: John Lyons Computer Software, 6 Queens Road, Camberley, Surrey GU15 3AN.
Tel: 0276 65275

THIS multiple choice software is aimed at a very specific niche in the education market. It is designed to be used by students following City and Guilds courses 706/1 and 706/2 and the RSH nutrition certificate course, but the materials may also be useful for GCSE home economics.

The basic format is very straightforward. Students are asked 20 multiple choice questions on one of 12 topics ranging from different food groups, such as carbohydrates, vitamins and proteins, through to tests on electricity, heat, food chemistry and the human digestive system.

When the disc is loaded an initial menu gives a variety of options. The first is to try the quiz and candidates need to enter their names. Next, they are asked if they require an answer to be given if they fail to get a question correct and then asked for a question time limit within the range 10 to 20 seconds. Finally, the topic is selected.

Questions, along with four possible answers are displayed in large clear text, with sensible use of colour. This is very good for individual work and there would be no problem with a group seeing the screen and being able to read it. To answer a question, you must tap 1, 2, 3 or 4 according to their choice. If they do not know the answer there is a pass option.

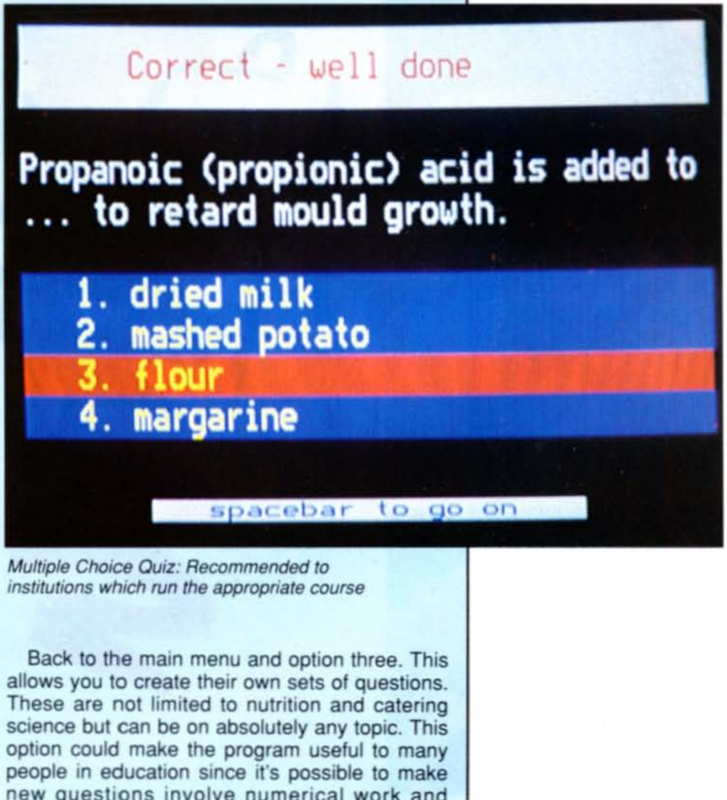
I must make what seems like a standard protest about the noises: I dislike beeps and tunes. I can quite understand that other people might think they add something, but why not have an option to turn it off?

At the end of the 20 questions a score is given as a percentage and a comment is also added. This can range from *excellent* work, through *more revision needed* to *fail*. The questions asked are of the pure recall kind – appropriate to the students that the software is aimed at.

Option two from the main menu is to print out questions. The ability to transfer a test to paper is obviously very useful and this routine has a number of plus points, perhaps the most important being that it is possible to print any selection of 20 questions.

The technique is simple. First a test topic is selected and the questions are displayed one at a time. These can be selected or rejected and at any time a new test topic can be selected. This allows any choice of 20 from the full 240 questions on the disc. The selected questions can also be saved to disc for later work.

I had a number of problems with this part of the program. Firstly, I did not like the style of the printout which left large gaps in the middle of a question. Secondly, there was a tendency for the program to crash out entirely when returning to the main menu. The publisher and author were both very helpful on these points and production discs will be amended.



```
Correct - well done

Propanoic (propionic) acid is added to
... to retard mould growth.

1. dried milk
2. mashed potato
3. flour
4. margarine

spacebar to go on
```

Multiple Choice Quiz: Recommended to institutions which run the appropriate course

Back to the main menu and option three. This allows you to create their own sets of questions. These are not limited to nutrition and catering science but can be on absolutely any topic. This option could make the program useful to many people in education since it's possible to make new questions involve numerical work and understanding as well as just memory.

It is a bit fiddly to incorporate new tests on to the menu but the handbook gives full details. This little book is well written and displays a number of screen shots to steer you through the program.

This software is ideal for its target market but as a more general tool it has limitations. While it is possible to create your own multi-choice tests, it is annoying that these must have 20 questions in them. I would prefer the tests without the all too short question time limit. As a revision aid, no time limits would be better. Most tests and exams have an overall time limit – say 20 minutes for 20 questions – and this would be a better option.

I can recommend this program to institutions which run the appropriate courses and they will probably use it to generate their own materials. I too shall use it because of the ability to select questions for printing from a large data store.

Summing up

The best point must be that you can adapt this to any revision subject but it is still limited in use. A sound on/off option would have been nice.

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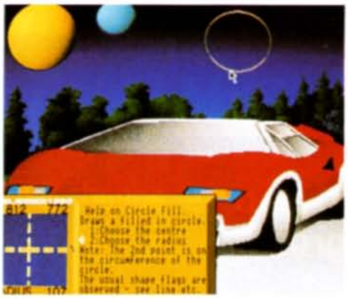
Archimedes



Help on Circle Fill.
Draws a filled in circle.
1:Choose the centre
2:Choose the radius
Note: The 2nd point is on the circumference of the circle.
The usual shape flags are observed - see line etc.

Set Fill Style

Silhouette and Parameters
TILT 343
LEAN 39
AXIS SCALE
AXIS SCALE
4
Atelier

"- I didn't think that there was room in the market for another art package of any quality but I was wrong........along comes "Atelier" from Minerva Software and what an art program it is!.......It takes the computer art program to a new level !" *(A & B Computing August 1989) -*

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SOFTWARE

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Quest for knowledge

John Clements examines some database software upgraded to the Archimedes

Product: Archimedes Quest
Price: £30
Supplier: The Advisory Unit for Microtechnology in Education, Endymion Road, Hatfield, Herts AL10 8AU.
Tel: 07072 65443

MANY education users of BBC Micros will be considering the implications for them of changing from the 8 bit machines to the Archimedes series. This is especially true if you have limited budgets and little time to learn new software. It is, therefore, of more than passing interest when a well established item of software is made available for the new machine at a reasonable price.

To begin with you feel that you can continue your work with the minimum of inconvenience and, hopefully, improved facilities in a familiar setting. Archimedes Quest, or Quest32 as it is now called, is just such an example.

Quest32 is a database program enabling you to store, for example, names of schools with their addresses, phone numbers and number of pupils then find out which ones had phone numbers beginning 01 or were located in Scotland. More sophisticated searches are possible: Find all the schools in London with more than 1,000 pupils and post code starting with N.

Quest32 can handle quite large files. An example is DAT56 – provided on the program disc – which contains more than 1,000 records with room to spare and sorts at most impressive speeds. It took less than five seconds to sort the entire database according to age.

The software can be started by pressing Shift+Break or by clicking on its icon from the Desktop – although it doesn't multitask once loaded. You can LOAD or INFILE an existing data file or start to build one of your own. Help is always available by typing HELP ALL for information about the available commands and options. This is a particularly nice feature.

Many database programs are menu-driven so that you don't have to remember much about how to use the program, but this has the disadvantage that it's often difficult to find short cuts when you know what you want to do. Quest32 is command driven from a values screen which shows how the information is to be displayed and which information you want to show. Using the software builds up command lines in the form:

```
QUERY NAME IDENT "SMITH"
```

which finds only those entries where the name is Smith. Another example might be:

```
QUERY AGE GT 10 AND AGE LT 50
```

which would find people of ages greater than 10 and less then 50 years. Although this system means that you have to do a little more learning when at first it is possible to build the searches you require quite quickly. Furthermore you can edit search commands using the cursor and copy keys thus making the whole operation even easier.

There are a wide range of alternatives for searches all of which are available from both the manual and the help screens and all the commands make sense after a short period of use. Other examples of commonly used commands include:

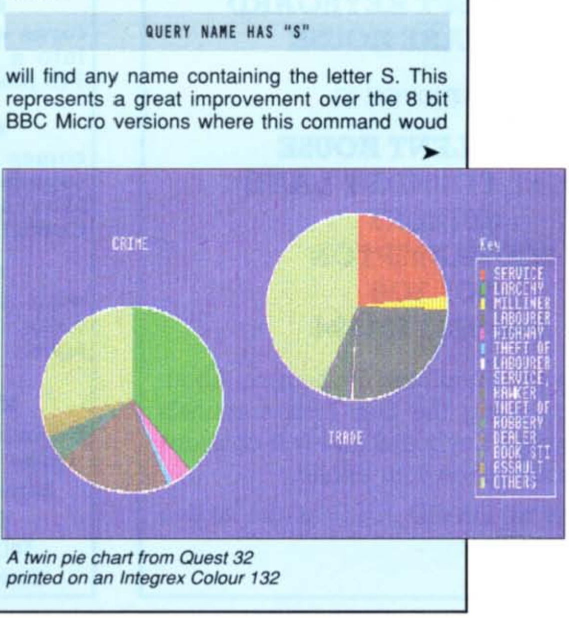
```
QUERY NAME STARTS "S"
```

which finds all names beginning with the letter S while:

```
QUERY NAME HAS "S"
```

will find any name containing the letter S. This represents a great improvement over the 8 bit BBC Micro versions where this command woud

➤



A twin pie chart from Quest 32 printed on an Integrex Colour 132 have been entered as:

```
QUERY NAME SUB "S"
```

LSUB (LeftSUB) can now be entered as STARTS and since this version of Quest accepts either form users familiar with earlier versions will have little new to learn.

Quest32 not only handles and sorts data, but has a range of statistical tools. These are called up with the command STATISTICS and normally apply to the data selected by the current QUERY command. The tools include:

- Scatter Graph
- Line Chart
- Histogram
- Bar Chart
- Pie Chart
- Averages
- Dispersion

Within each of these choices there are further ones so that, for example, if you select to draw a pie chart you can print up one or two.

I found that the area given over to the key on the more complex pie charts was rather too small to be able to see exactly which colour referred to which value. The best way to deal with this situation was to produce a special file called an order file so that one could then control how the information was eventually to be displayed. This is clearly explained in the manual and gives the very valuable option of being able to display data in order of days of the week or months of the year which normally have to be sorted alphabetically or numerically. After each graph or chart is drawn logical options are given including screen dumping and screen saving so that the information could be used in a desk top publishing or art package.

Two options are given for screen dumping: These are small black and white or large with grey scaling. The black and white option has limited use, especially with pie charts, while the large grey scaled prints are also difficult to interpret where up to 15 sectors of a pie chart each have their own colour. The program only supports standard Epson-compatible printers so in order to get a colour copy of a pie chart I saved the screen and then used !Paint to drive the Integrex Colour 132.

Summing up

This is a nice package and a much improved version of the program already available for the BBC B and Master. The Statistics Tools and Help Pages are strong features of the program. Additionally the utilities supplied with the resting options for combining information from Quest with other packages.

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TOMCAT

... flying high

Price: £1.99
Supplier: Players, Mercury House,
Calleva Park, Aldermaston, Berkshire
RG7 4QW.
Tel: 0734 817421

TOMCAT takes place in the first half of the 21st century. Land became scarce and expensive so large artificial islands were created at sea. One of them – Artrock 6 – is used as a defense installation and is completely automated.

Unfortunately, a freak storm damaged the controlling software, causing all the automatic machinery to go berserk. Now, anything that approaches the island is destroyed by the defense systems.

You have been chosen to pilot an American F14 Tomcat fighter and destroy this danger to shipping.

The loading screen depicting an F14 Tomcat fighter is good and this is followed by an even better Mode 4 graphic display. Overlaid on it is the small, central playing window.

You get a bird's eye view of the plane flying low over the island. The graphics are quite detailed, but the green colouring caused unpleasant stripes on my colour TV and I found it better in black and white. The display on a monitor is excellent with no colour problems.

You can move your plane forwards, backwards, left and right. As you move left or right the playing window smoothly scrolls in the appropriate direction.

Groung gun emplacements pop up, swivel round and fire their cannon at you while aircraft attack from the front. All can be shot easily with your own cannon, but there are so many attackers that it is easy to lose a couple of lives very quickly.

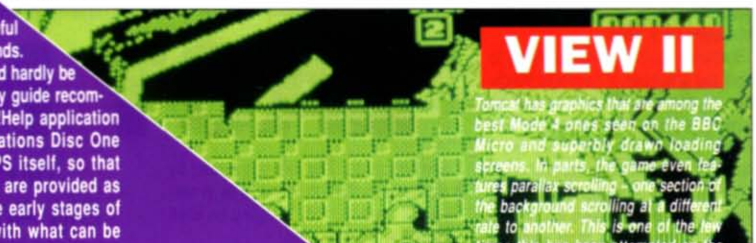
Animation is sluggish but acceptable. Things slow down more when several objects are on screen at the same time.

I find it impossible to play for more than a few minutes as the frustration factor is far too high, although a friend has managed to reach level two. From the cassette files I assume that there are four levels.

We should all be pleased that Players is sticking with the Acorn market, but perhaps future offerings could be more playable.

Rog Frost

Graphics	7
Sound	3
Playability	4
Value for money	6
Overall	5



VIEW II

Tomcat has graphics that are among the best Mode 4 ones seen on the BBC Micro and superbly drawn loading screens. In parts, the game even features parallax scrolling – one section of the background scrolling at a different rate to another. This is one of the few times this has been attempted on the BBC Micro.

Unfortunately, even the poor 8 bit BBC Micro hasn't got the brute processing power to implement this type of game format. Players is to be commended for attempting it and should consider re-writing it for the Archimedes series.

Roland Waddilove

ALPS

...creative heights

Price: £32
Requirements: Archimedes
Supplier: Alpine Software, PO Box
25, Portadown, Craigavon
BT63 5UT.

ONE problem in the world of adventure games is rarely publicly acknowledged. It is this: Most good programmers aren't all that creative and most creative and imaginative types are lousy programmers.

People of the calibre of Peter Killworth and Jon Thackray of the Oxbridge Mob or the Level 9 lot are few and far between.

It was for that reason that I welcomed the advent of such utilities as The Quill, which released the imaginative talents of, for example, Geoff Larsen as a writer of adventures for the BBC Micro and Electron.

So when the ALPS (Adventure Language Programming System) package landed on my desk I sat up and took notice.

A few mental relays clicked over and I checked my files: Yes, I had seen an adventure produced by ALPS for the BBC Micro – written in fact by Philip Hawthorne, who is the person responsible for the major part of ALPS the utility.

I thought well of Plague Planet in its BBC Micro version, so what was I going to make of ALPS for the Archimedes?

It comes with two spiral-bound booklets: A 40 page introductory guide sets the scene, and a more detailed reference guide provides specific examples of every aspect of the utility. A couple of hours devoted to careful reading will pay dividends.

Getting started could hardly be easier. The introductory guide recommends installing the !Help application from Risc OS Applications Disc One before installing ALPS itself, so that interactive comments are provided as you work through the early stages of getting acquainted with what can be done.

Next you are taken through the procedure of setting up a data disc, either on a floppy or a hard disc. Again, things could hardly be simpler.

After this Philip Hawthorne provides us with a small adventure scenario. It's not aimed at stimulating the imagination, but is a very helpful tool for taking a novice through much of what ALPS provides for the would-be adventure writer.

ALPS provides a starter game containing a basic vocabulary of movement verbs and some other commands together with the necessary system messages which can then be modified to suit the user's preferences.

This is an important and particularly helpful feature since much repetitive work is thus avoided since the starter game can be used every time you want to create a new adventure.

Entering the program's text editor is simple, thanks again to the explicit instructions given – and that's the next step. In this instance the aim is to allocate the player's strength and capacity to carry objects. These abilities are determined in PROC(2) of the starter program, and the alterations needed to do this are carefully explained.

It's time to quit the micro in favour of pencil and paper while the adventure is mapped out and the various room descriptions considered. ALPS can handle up to 1,000 locations, enough to satisfy the most ambitious writer.

Philip uses room 1 to hold whatever objects the player is currently carrying, so creating the map should begin at room 2 (or a higher number if desired).

Each room is assigned eight flags, six of which are available to the user. The two already designated are the *light* and *visited* ones which can be toggled on or off as desired via the mouse.

The other six can make a given room airless, boiling hot, freezing, or anything else that occurs to the writer so that they can only be visited safely with special equipment.

Another powerful method of controlling the adventure is through *exit routines* which enable you to create invisible exits, locked doors, blocked exits and so on and appropriate messages are already provided for invisible exits and closed doors should the player try to go through them.

I have spent time describing in detail the initial procedures for finding your way into ALPS because there is one particular kind of person I should like to encourage to use this utility – the adventure player who can just about handle the desktop environment of the Archimedes and little else.

ALPS has been carefully and painstakingly created so that, together with the introductory and reference guides, almost anyone with a good imagination can create an adventure that is satisfying, entertaining and – above all – playable.

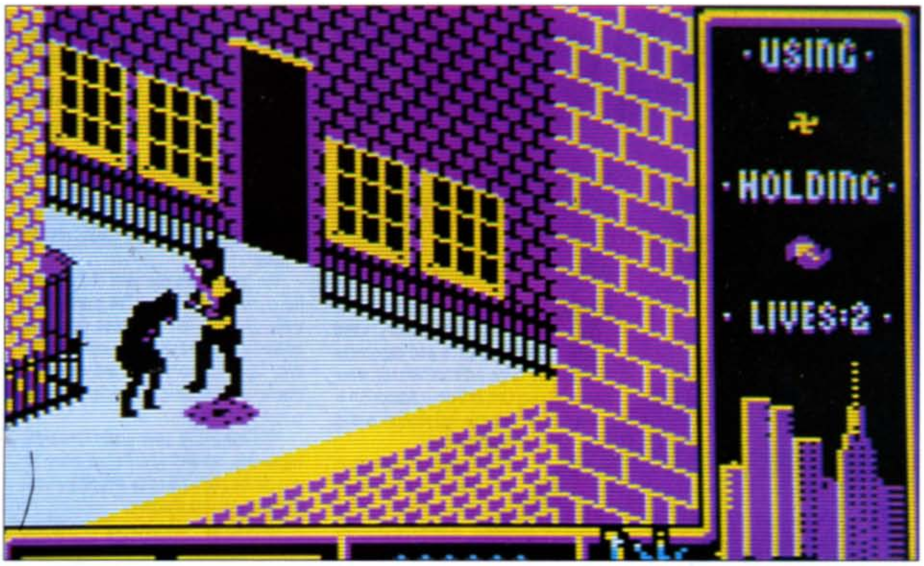
Mad Hatter

Graphics	n/a
Sound	n/a
Usability	10
Value for money	10
Overall	10

LAST NINJA 2

...bite at the Big Apple

Price: £11.95 (disc) £9.95 (tape)
Supplier: Superior Software, P.O. Box 6,
Brigg, S. Humberside DN20 9NH.
Tel: 0652 58585



HAVING finally wiped out the evil that destroyed your relatives and friends you – as the Last Ninja – take a boat to the USA and end up in the Big Apple itself. But here you discover the ultimate evil: Kunitoki.

So, always ready to fight for the good, you don your black Ninja robes to take on the rotting horrors of New York.

You begin standing on a rooftop near Central Park. Going inside you find a thug – who you can easily dispose of – and by being fairly aggressive at the wall you can open a trapdoor and – dropping down into the next room – you find a key.

Going outside you find a rather belligerent policeman – who clearly doesn't think anyone should walk around in broad daylight wearing black robes.

Scattered about are various items to collect and a number of Kunitoki's henchmen – it's best to match them weapon for weapon if you can. The final escape from Central Park involves leaping across a lethal pond , first avoiding a swarm of bees.

You come out on to the street, where more of Kunitoki's hired villains will try to do you in and in an effort to avoid them you take to the sewers where it's very easy to get lost.

Unfortunately there's a lot more hoodlums down here and a crocodile that needs an explosive send off.

From there you make it into the lower levels and Kunitoki's drugs factory with more thugs and plenty of climbing and jumping to do. The exit is guarded by another animal which seems to be in desperate need of food. Standing on lines around here can be lethal.

The next level takes place in some offices where you need to fight your way through even more thugs and villains, across the outside of the building and finally to the roof where a helicopter whisks you to the final level within Kunitoki's castle.

Unlike earlier levels, on the final one any baddies you dispose of are reincarnated each time you re-enter a screen.

The game has been brilliantly executed by that master programmer Peter Scott. The playing keys are carried forward from The Last Ninja as is the overall diagonal movement.

Animation is excellent and there's lots of detailed scenery. The puzzles are quite fiendish – and hitting the wall is often beneficial.

It's nice to see that Superior can still come up with high quality, original games.

Steve Turnbull

Graphics	*10*
Sound	*8*
Playability	*9*
Value for money	*10*
Overall	*9*

FAMILY FAVOURITES

...tricky trio

Price: £19.95
Supplier: Minerva Software, 69
Sidwell Street, Exeter EX4
6PH
Tel: 0392 437756

FROM the hands of the Pardesis comes a trilogy of games designed to appeal to a wide cross-section of the potential games-playing Archimedes-owning public.

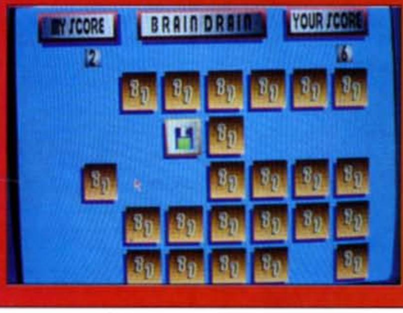
Dead End is that old favourite Tron in a new guise. The music and graphics are tremendously effective and certainly get the adrenaline running.

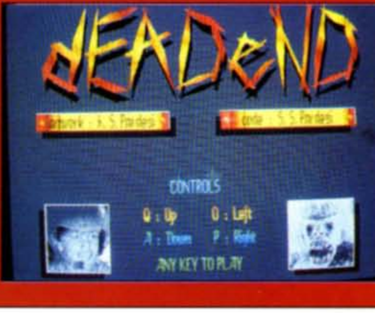
The playing area occupies two thirds of the screen and is extremely colourful. In the middle is a block which you can't drive through.

The micro plays your opponent although it doesn't actually think, it never runs into anything unless it has no choice.

This makes it tough but not impossible to beat, although your own strategy needs to be pretty simple – just keep going until the other guy runs into difficulty.

After a few goes I got the hang of it





CAVERNS

...down a hole

Price: £17.95
Supplier: Minerva Software, 69 Sidwell Street, Exeter EX4 6PH
Tel: 0392 437756

THE flow of games from Minerva Software continues unabated and this month the offerings look much more interesting. The title screen of Caverns reveals four views of an interestingly designed spaceship, all of which rotate in 3D at different speeds in a truly impressive display.

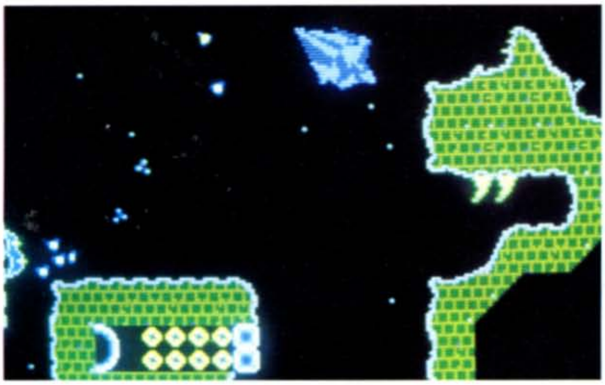
Then there's a long delay as the main program loads and the instruction screen appears. This is quite a letdown, being just coloured text on an otherwise blank screen.

You can select an option which provides instructions and fills you in on the plot – once again the instructions are just boring screens of coloured text with several grammatical errors and spelling mistakes.

The game involves you moving around underground caverns in a spaceship, deactivating switches, moving objects from one place to another and finally causing a cataclysmic explosion in the enemy H.Q. – all fairly routine stuff for us saviours of the universe.

Pressing the spacebar gets you into the game and you get another letdown: It's not in 3D at all – in fact the apparent 3Dness of your ship is simply the way the separate sprites have been drawn (probably on a 3D design package) and it's very disconcerting.

You start off in a protected area, and giving your ship a little thrust moves it up and out. You can use either the mouse or the keyboard – the former is very tricky to get the hang of although I preferred it.



The first thing you spot in this strange environment is a wormlike creature wiggling around on the bottom – I use this word in preference to *ground* because the whole feel of the game is that it's underwater rather than flying.

There's a gentle gravitational effect which will catch the unwary as your acceleration builds up slowly but inexorably. The thrust from your ship is very powerful by comparison, and you move around with tiny bursts of power. The worm is harmless and can't be damaged by shooting.

The background scrolls smoothly and you can see many different types of terrain with quite a high degree of detail. At first there seems little to do until you come across one of the fixed gun stations that will shoot at you, or a barrier composed of blocks that explode – often setting off a chain reaction with others around it.

You can shoot a blob from a gun mounted in the front of your vessel. It is fired when you release the button, and the longer you hold the key down the more powerful the shot.

On impact your shell explodes and breaks into a number of pieces which can ricochet off and do more damage. In fact this is the easiest way of knocking out the first gun emplacement – simply by staying out of direct line and firing near it.

Apart from the gun there's another strange thing which launches duplicates of itself upwards to devastating effect. Blowing up the original puts an end to its tricks.

Having played the game for many hours I found a type of block that reproduces itself like a version of the Life game once it's been shot at, one of the necessary switches that could be shot at, and one that was so well defended I couldn't get at it.

Moving into the second area revealed a fish splashing around in a pool and a tunnel that seems impossible to get out of. Knocking out part of the ceiling caused a big white bubble to descend blocking the route completely.

The graphics are colourful and effectively used, but sound is almost non-existent. The game seems reasonably good but a little too hard and I soon ran out of places to go although the play area is quite huge – I just ran out of options.

The title screen is misleading but that's not the game's fault and the information screens lack polish. I did enjoy playing it – I just wish I could have got further.

Lazarus

Graphics	*8*
Sound	*3*
Playability	*8*
Value for money	*7*
Overall	*6*

---

and won my first round, which is where the first difference lay: In an intermediate solo stage you are presented with the 10 digits in the button telephone orientation, the micro then chooses a sequence and you have to guide your line through each key in the right order – it isn't easy and requires instantaneous good route planning

On the next proper level there are two blocks in the way, three on the next and so on – at least I got to third so I haven't seen the rest. On the whole the only thing wrong with the game is that the keys aren't standard Q, A, O and P instead of Z, X, ? and ".

***Gridlock* is Reversi otherwise known as Othello. Again the graphics are excellent but it doesn't play a very strong game on either of the two levels – which makes it ideal for people who prefer to beat the micro.**

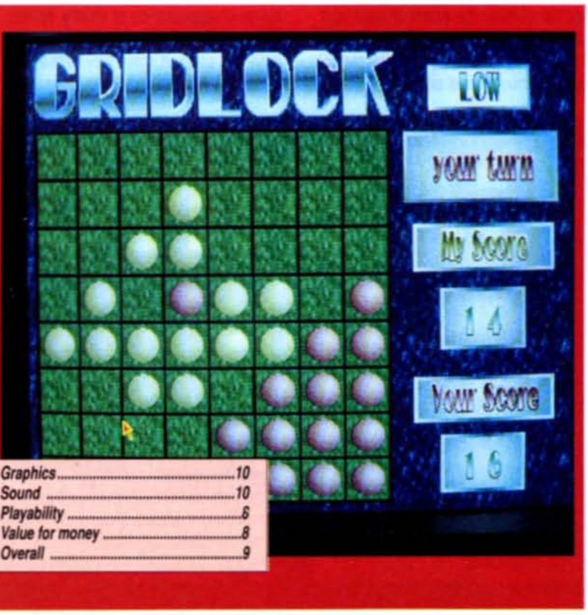
***Brain Drain*, one for kids of any age that can handle a mouse, is Pelmanism, the memory game. Lay out cards with pictures on them face down, turn them over in pairs. If you match correctly remove them from the board and have another go, otherwise turn them back.**

Again you play against the micro, although you might think that the machine could remember everything well it's been programmed with a limited memory for cards and their positions, so after a while it forgets, even more completely than you would.

There are three levels of difficulty but I reckon you'd need a photographic memory to beat the micro on the hard level.

All the games in this compilation are very simple and competently programmed although I'd have preferred a challenge in Gridlock. In every case the graphics are superb and the sounds, too, are very well integrated. I can certainly recommend these games.

Steve Turnbull



Graphics	*10*
Sound	*10*
Playability	*6*
Value for money	*8*
Overall	*9*

RICOCHET

...having a ball

Price: £11.99 (disc) £9.99 (tape)
Supplier: Superior, PO Box 6, Brigg, South Humberside DN20 9NH.
Tel: 0652 58585

SUPERIOR Software is one of the few remaining software houses to support the BBC Micro with any great conviction. Month after month, the company releases a stream of high quality software catering for all tastes.

With such a prolific output I suppose it was inevitable that sooner or later the stream would begin to dry up and the output would start to be supplemented by games of a lesser calibre.

Don't get me wrong, I am not saying that Ricochet is garbage, just that it's all been done before, better, and by Superior itself.

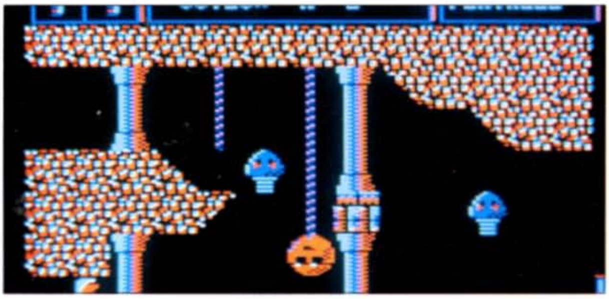
Ricochet is a story about Sprat the big red ball and its adventures in ladders and levels land. Fortunately I received the pre-production version so I was spared the drivel that usually accompanies this type of game.

You know, the bit about how Sprat was imprisoned by the deranged alien wizard and how he can never be free until he has located the five egg timers that control the space time continuum.

OK, so I made it up – but the bit about the egg timers is true.

The game is set in five different landscapes – the Fortress, Techlev, Derelict, the UFO and the Ancients, all of which contain functionally similar structures, such as ladders and ropes, but these objects assume different guises depending on which landscape you are in.

Unlike Superior's excellent game, Exile, the backgrounds are all drawn on a large and chunky scale. Initially I thought that this may have limited the extent of each landscape, but was pleased with the magnitude of the playing area as I delved deeper into the catacombs on level one.



Sprat moves in typical ball-like fashion, rolling left and right, and up and down ladders. It can also bounce. With your ball on a firm surface, depress the squish button and then release it to bounce, the height reached being determined by the duration of the squish.

Directional control is applied by simultaneously pressing left/squish or right/squish key combinations, thus propelling the rotund Sprat diagonally skywards.

Sprat responds instantly to any key press, in fact, if anything the controls are oversensitive. I frequently had trouble trying to move the ball one space at a time.

The animation is fast and smooth, with the falling, ricocheting, ball routines being particularly well done. Sound is used rather sparingly, there is no title tune and the spot effects are no more than OK.

One minor gripe concerns the occasional disappearance of enemy sprites. When more than a handful of characters move in a confined space they have a habit of overlapping and *exclusive or-ing* themselves into invisibility, a habit which can be quite disconcerting at times.

Although cosmetically different, each of the five levels is basically the same. The tunnel complex is divided into several sections, with the entrance to each new section being barred by an obstacle.

Doors are common to all levels and, not surprisingly, these are opened using keys. However, there are a number of doors and a number of keys, but they don't all match. To complicate matters further, you are informed that Sprat is incapable of carrying more than two objects at any one time.

Guess who's going to spend a great deal of time wandering backwards and forwards stuffing keys in locks and hoping for the best.

The method adopted to impede your progress is the large immovable object technique. In addition to the doors, each level contains several strategically placed objects – these can be robbers, slugs, or even tax demands.

In these instances the keys are useless, what you need to find is the specific object that pairs up with the character blocking your progress.

As I mentioned earlier, the levels are huge and your search for the egg timer will be a long one. Thankfully, the programmers have provided a little routine that prevents you from having to re-play the earlier levels once you have completed them.

Successful completion of a level is rewarded with a password. Pressing P on the title screen causes the program to prompt you for this password, just type your entry and you are transported to the corresponding level.

One word of warning: Ensure that the Caps Lock light is on before you enter the password, as it would appear that the program doesn't check for lower case letters.

Ricochet is an extensive ladders and levels game that does nothing particularly badly and nothing particularly well. Innovation is kept to a minimum and tried and trusted features are used throughout. Ho hum...yawn!

Carol Barrow

Graphics	*7*
Sound	*5*
Playability	*7*
Value for money	*7*
Overall	*7*

VIEW II

Not since Palace of Magic have I been hooked to an arcade adventure, but this frustrating game has me securely in its grip. The way the ball bounces round the screen drives me round the bend.

The objects and obstacles are mini puzzles – find the object and place it on the corresponding pad. A brilliant game that makes a welcome change from the recent Sam repeats.

Janice Murray

CASINO

...more ways to lose

Price: £24.95
Supplier: Minerva Software, 69 Sidwell Street, Exeter EX4 6PH
Tel: 0392 437756

BACK in our October 1989 issue we reviewed the three games that made up Casino with a promise from Minerva that more were on the way. Well, here is the entire Casino collection, a set of multi-tasking programs that sit on the icon bar.

In all cases you need the Banker, which holds details of each player and how much money they have. To play the new Backgammon you also need the dice program. Clicking on the *Backgammon* icon brings up an excellent rendition of the playing area with the pieces in position. You drag bets over from to the window from two player windows to set them up as the new players for the game.

You then roll the dice – there's a quick interchange between the two multi-tasking programs – and you can move your pieces as allowed by the rules. Although betting is allowed it only seems to be on the outcome as seen from the start – the doubling cube is missing. *The Fruit Machine* has been revamped and now includes lots of flashing lights with much improved animation. I started betting very carefully on this – when your money is held by the micro and there's no way of adding to it you soon learn caution.

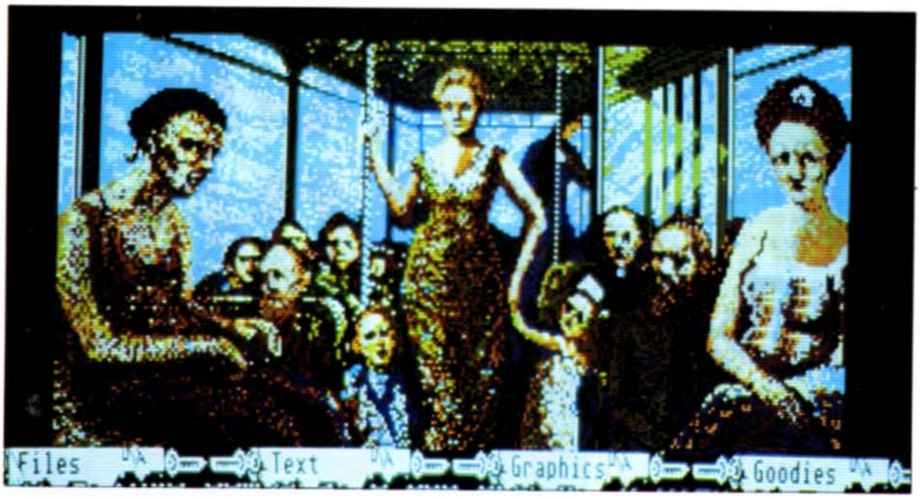
After a while I gained confidence and realised that this was more than a fruit machine, it's a money machine – you can't lose in the long run.

Perhaps Minerva should check the programming – on the one occassion that I got three Minerva logos I also got the Hold.

Casino is quite a bit of fun for one or two players, but it gets into an argument when you have more because of one rather important problem – there's only one mouse.

Geoff Brown

Graphics	*8*
Sound	*1*
Playability	*10*
Value for money	*10*
Overall	*8*



JINXTER

...a dream of a genie

Price: Part of Hyperpack – £89.95 (also including Orion, Repton 3, Word Up Word Down, Quazer, Star Trader, White Magic, Holed Out, Pacmania, Terramex, Conqueror and Corruption).
Supplier: CIS, 8 Herbrand Street, London WC1N 1HZ.
Tel: 01-833 4023
Minimum Requirements: Archimedes 3000

I NEEDED no more than about 30 minutes' play to realise that here was another brilliant conversion of a Magnetic Scrolls winner. An excellent text and graphics adventure, Jinxter has been co-written by Michael Bywater – "Punch magazine's master of wild invective", lauds The Times – and the Magnetic Scrolls development team.

The game is poles apart from the usual witches, wizards and warlock type of adventure. It's very funny for one thing, and for another there is nary a smidgeon of hackneyed hobbits, tiresome trolls or boring berserkers.

This jolly jape is set in Aquitania, a green and pleasant land blessed with luck and laughter, a land where accidents and misadventure never dare show their miserable faces.

But all this good fortune and general well-being has not come about by chance. As with many tales of fantasy and fable, there is often a worm in the apple. In this case it's several worms, going under the name of the Green Witches.

Said witches are always looking for ways of causing trouble, but are kept in check by the magical powers of a special charm bracelet. Should anything untoward happen to this bracelet, those mischievious green warts might start up their nonsense again.

And now by an amazing coincidence, just as you boot Jinxter, the bracelet is nicked and its charms scattered to the five winds. Having bought the game, you have no choice but to assist by recovering the charms and so prevent the said green hags from getting too uppity.

All this information is imparted as you leave the bus to be mown down in the prime of your life. You cannot avoid this tragic beginning of a game in which you cannot die even when confronted with seven busy dwarves or an axe-wielding intruder. It is here that you are given the above synopsis, though this flashes by so fast that I couldn't read it.

Fruit Machine
HOLD
HOLD
=x20
=x10
=x8
=x6
=x4
Roulette Table
Backgammon
Thrown 5,4 for player ,or
Dice
BlackJack Table
Dealer
Steve
Current Balance £ 5.20
Next bet £ 0.10

The giggles come in many guises: For example, one of the characters you'll meet from time to time is the Guardian from Beyond the Realms of Time. Opting out of wearing the traditional long flowing robes, with associated sceptre and appropriate wise and sagelike aspect, he's a sullen and reluctant time-server attired in a herringbone overcoat. Think of a less articulate Arthur Daley and you'll have some idea of the character.

"What's the point of wossname, immortality," he grouses, "if you can't get a decent bit of cheese in your sandwich, narmean?"

Although his vocabulary lacks something in breadth, you'll find there are places where you'll need to emulate it. For instance, the charms have to be referred to as the doodah, thingy, oojimy, watchercallit and doofer when you want to cast a spell with them.

As the Guardian so succintly put it, you task is to "Just find the watchercallit, say the doodah and thingie's your wossname. Charm. Word. Bob. Uncle. Narmean?".

The characters in Jinxter really make the game zing. There's a Billy Bunter of a baker who won't take you on as his assistant until you've learned how to bake a decent loaf. The cantankerous village postmistress thinks she's a Calamity Jane – and just how do you stop her doorbell from ringing?

Who is responsible for all the bizarre goings-on in your house? And with what can you bung the hole in the canoe? I looked high and low for old Glitch, thinking he was perfect for stuffing into a crevice, but no luck. The mouse is an adequate substitute, but if you use it you won't be able to solve a later puzzle.

The text is rich and witty and there is an attention to detail that very few other adventures can match. The folding deckchair, for example, has bloodstains on it – if you've ever wrestled with a deckchair, you'll know how they got there.

The ticket inspector on the bus, the North-facing conservatory, the Whicker chair, the benches in the pub garden, the gravel path and the plum roll are a few of the many items which will well reward an examination.

Try dialling some well known numbers like 999 or 192 on the phone for further examples of the program's depth and wit.

Many delights and surprises await you in Jinxter, an adventure in which the only harm you can do yourself is from laughing or head scratching.

Although only available as part of the Hyperpack it is a delightful and welcome addition to the Archimedes, and as it works out at £7.50 it's a bargain. 'Cuse me now, I must have another chat with the gardener.

Bob Chappell

Presentation	*10*
Atmosphere	*10*
Puzzlement	*10*
Value for money	*10*
Overall	*10*

Price: £19.95
Supplier: The Fourth Dimension, P.O. Box 4444, Sheffield
Tel: 0742 700661
Compatibility: Archimedes series and A3000, 1Mb ram minimum.

ARCADE SOCCER

...it's a funny old game

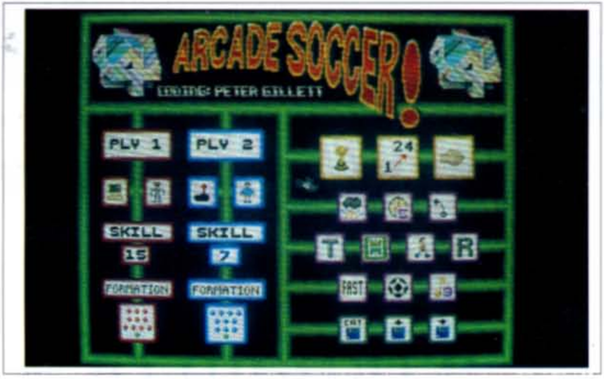
MANY game conversions fail to hit their goal but this game is excellent – though there's one thing to watch when you start.

To prevent the DeskTop from grabbing valuable memory Arcade Soccer must be booted with Shift+Break – if you double-click its icon all you get is the title screen then the system crashes.

Pressing the spacebar takes you to the main menu screen which is crammed with small but descriptive icons. All the options available in the original 8 bit version are there – Cup, Championship or Friendly matches, goalie skill level control, slow/fast game, control of length of play, play against micro, use keyboard or joystick and so on.

But there's much more: Weather control – choose between sunny, rainy, showers with thunder and lightning, continuous heavy rain with thunder and lightning – this affects how far player slides in a tackle and whether he spins out of control after it. Then there's general play formation, either 4-3-3, 3-4-3 or 3-3-4 and minimum kick distance. When you kick a ball the strength depends on how long you've held the kick key depressed.

There's a setting which monitors the maximum amount of swerve you can introduce when kicking the ball. On the main screen you can get a view of the whole pitch in the top left corner showing the positions of all the players, you can specify how big you want it or remove it altogether – I found this helpful when taking goal kicks and throwing in from the line.



All the players run at the same speed except the one with the ball, who is slower. You can toggle an option to make him travel at the same speed as the others, but I found this gave a less realistic effect.

One of the best effects of the whole game is the replay when a goal is scored. You get a fast rewind in black and white – with the screen displaying a flashing REW symbol just like a video machine then you get PLAY with the goal being scored again slightly slower than before. You can opt for a quick replay, a longer one or none at all.

Two other icons let you modify playing speed – I didn't find Fast particularly hard to cope with – and you can change the pattern on the ball.

Once you've set up your ideal playing conditions you move to the games themselves. Playing a friendly is the best way to get started and if you really want to be sure you're not going to lose set the options for two player – and just play one!

Once you get on to the playing screen more options become available: You can alter the colour of the pitch and, to compensate, the map. Press f5 and f6 simultaneously you can quit the game.

The only thing that separates this from the highly polished 16 bit games are the various screens before a match, at half time and after: These are awful and look as if they have been carried direct from the 8 bit micro.

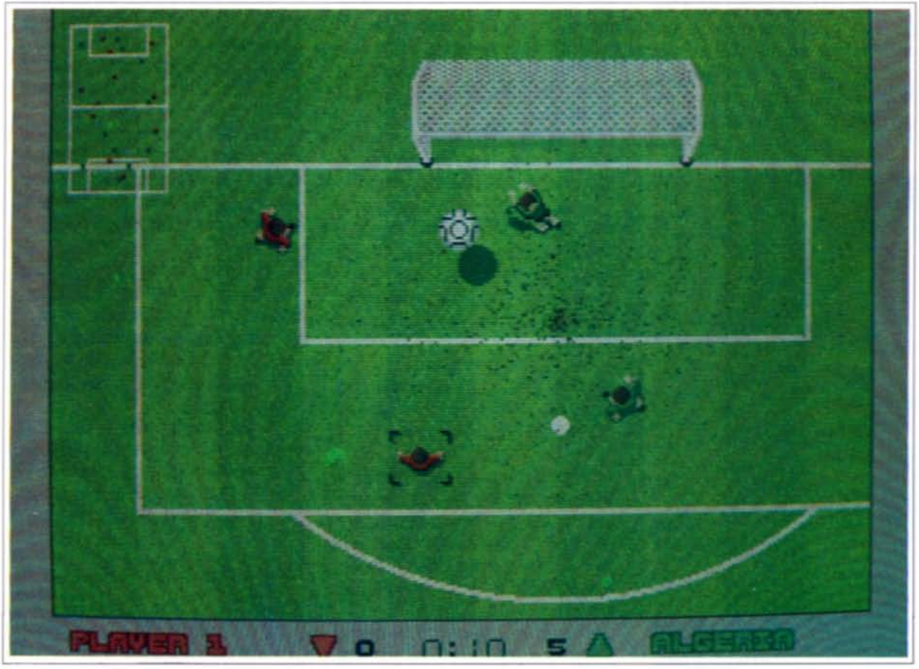
The ability to have 24 players is still available and you can save the World Cup state to disc to play again later. Plus the option to use the Voltmace joystick.

So what's it like to play? Excellent. I'm not a real soccer buff, but I thoroughly enjoyed playing this desktop version – even more than the 8 bit one.

The micro-controlled players behave in an amazingly realistic manner following up shoots by "unintentionally" barging the goalie – occasionally having the desired effect of pushing the ball over the line.

The movement is much smoother and, on the whole responsive to the point where I found it possible to win against the micro even when the goalies had equally matched skills.

Teri Paul



Presentation	*8*
Atmosphere	*8*
Puzzlement	*10*
Value for money	*9*
Overall	*9*

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On the agenda...

- *Starting point for GCSE*
- *A lost micro tone*
- *Micro movement of telescopes*
- *Switching the drive number*
- *Detecting a faulty VIA*
- *Lines across the monitor*
- *Trying to boot drive 2*

Project Design

I AM following a GCSE course in technology and need to design and construct a major project. I have decided to make an illuminated sign and the control software to go with it. It will be for the BBC B and the micro must also be able to drive any other project connected to the user and printer ports.

I hope to be able to develop control systems using keyboard input, menu prompts and a user program. I would be grateful if you could supply me with any information you might think is relevant. – **Richard Fannon, Riseley, Bedford.**

● *I am sure you don't want me to do the project for you, but it does sound very vague. You need to be more precise in your definitions. Your letter only gives a very sketchy idea of what you want to do. For example what will the illuminated sign say? What use is it? How do you want to attach it to the micro? The user port is the first choice, but you then say that you want to leave it free for other projects.*

The first thing to do with any project is to sort out exactly what you want to achieve, how it will behave and how it will interact. Only when you know this can you even begin to find out how you can implement such a system.

Moribund micro

A FAULT has occurred on my BBC Micro and I would appreciate your advice. On switching on power, a single tone – the first note of the normal start-up sound – is generated continuously and the machine is disabled, the screen shows flashing lines or is blank and the Caps Lock light is on. The machine is not heavily used and is in good general order. – **R.W. Leach, Sittingbourne, Kent.**

● *I'm sorry, but these symptoms only tell me that your micro is broken. However, common causes of non-functioning like this are bad connections to the keyboard, faulty connections – possibly caused by a bad socket – on the CPU, rom or memory or a faulty chip – virtually any one that connects to the data bus.*

You can try pushing all the chips down and also removing, checking and re-fitting the keyboard cable. Failing that, it shoud to be looked at with test equipment to pinpoint the problem.

Telescope control

I'VE followed the Body Building series with fascination over the past few years and have been tempted to have a go myself. However, being of limited ability, I thought I would seek your opinion before commiting hard cash to the project.

What I would like to achieve is a means of driving a Dobsonian mounting for a telescope by my micro. The mounting is an altitude/azimuth system of securing a telescope, much used by amateurs. It depends on Teflon bearings to achieve smooth control but is unsuitable for astrophotography because it is undriven. The problem is to drive in two axes simultaneously. Now the questions:

Are the Body Build stepper motors of sufficient power to drive the telescope? Although the bearings are very good, the telescope's mass is quite considerable.

Could you please give me a clue as to what other Body Build items I would need to have, and which back articles I would have to read? I also need the equations to use for the actual guidance. Have you any idea where I can get them? – **Paul Lee, Wilmslow, Cheshire.**

● *I also have a great interest in astronomy and own a 10in Mead Shmidt-Cassegrain telescope. However driving a telescope with stepping motors is not as easy as it sounds.*

There are two problems and the first is one of positional feedback. Stepping motors are fine for knowing how far you have gone but not so good for where it started from. The second and bigger problem is one of mechanical coupling and stability. This covers all sorts of problems like motor couplings, gear backlash, vibration and telescope oscillation.

There is an excellent book covering many of the problems: Microcomputer Control of Telescopes *by M. Trueblood, published by Willmann-Bell, ISBN 0-943396-05-0. Also with a Dobsonian mount you have the problem of field rotation even when you track at sidereal rate, making photgraphy difficult.*

A more promising approach is the digital setting circles that have recently appeared on the

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market. I have half-built some mechanical couplings to allow my telescope movement to be monitored by the micro. This should allow conventional celestial coordinates to be produced whatever the form of mounting or alignment. However, the project has been temporarily halted due to lack of time.

I saw the equations you require in the February 1989 issue of Sky & Telescope.

Default drive

I HAVE a BBC B with Acorn DFS and 5.25in disc drive. This automatically defaults to drive 1 so most games don't work as they require the default drive to be 0. How can I change the default to drive 0?

I also have a Micro Pulse 3in disc drive which defaults to drive 0. I would like to be able to switch either drive to default to drive 0 or 1 depending on which software I am using. Please can you tell me how to do this? – **Edward Spink (age 11), Bollington, Macclesfield, Cheshire.**

● *Inside each disc drive is a row of links or small switches which tell the drive what number to respond to. If you open the drive up you will see them. The links may be labelled 0, 1, 2 as well as a few other letters.*

As your drive defaults to 1 you will find the link next to the 1 made. Remove this and make the link to 0. Note when you do this no other drive connected to the system must have link 0 made, as then two drives would attempt to transfer information at the same time.

So you can connect both your drives provided one is switched to 0 and the other to 1. Note also that in a system like this all disc drive motors come on together but only one light is lit.

Overheating display chips

I HAVE been using FontStyle for about a year. Recently I have found that after about two hours use for designing, the monitor screen starts to get yellow lines across it, making it difficult to continue.

Could you please tell me what is causing this, and if there is any cure? I would often like to go on designing for another two to three hours. – **N. M. Murray, Turvey, Bedford.**

● *You do not say if the lines are moving or static. If it is the latter then they are locked to the video signal and so the problem is likely to be in the area of the memory circuitry. However, if they are flickering, it is likely that there is an intermittent connection in the blue video line. This is because in additive primary terms white minus blue equals yellow.*

As the problem only appears after some time it is likely that some component is heat sensitive. First you have to decide if the problem is in your monitor or micro. When you see the lines again turn off one but not the other for half an hour to let it cool and then turn it back on. If the lines have disappeared then the fault is in the device you have turned off. If it turns out to be your micro at fault you can then hunt down the offending component with a freeze spray. A good starting point is IC6 which works very hard in hi-res modes.

Starting with autoboot

I HAVE a BBC B with Acorn DFS and Watford twin, double sided drive. While I have no trouble with autoboot in drive 0, I cannot get it to work in drive 2. With a double sided disc that has an autoboot file on the second side in the main drive, on selecting drive 2 by *DRIVE2 and autobooting the action produces nothing but a return to drive 0. If there is an auto boot file on the first side, it is the program on that side which is loaded.

A *OPT4, 3, command is written on both sides of the disc, and only the default directory and default library are used. I have tried various measures, including writing a confirming instruction of *DRIVE 2 in the !BOOT file. Could you please give any hint on what is wrong? – **Bernard Tuckwell, Steyning, W. Sussex.**

● *The auto boot sequence of Shift+Break will only work on side zero. because the action of pressing Break automatically sets the micro to drive 0 and then looks for the !BOOT file. Putting *DRIVE 2 in the !BOOT file on drive 2 will do no good as the micro never gets to see it. The only way to run an autoboot file on drive 2 is to use instructions like the following, either typed in from the keyboard or in the !BOOT file in drive 0.*

```
*DRIVE 2
*EXEC !BOOT
```

Be warned that this may not work all the time for many commercial programs assume that the disc is in drive 0 and reset the micro accordingly.

Useless user port

I HAVE an issue 7 BBC Micro with DDFS and a mouse, but this has stopped working properly. Also a homemade interface, which also connects to the user port has stopped operating as it should – only some of the output LEDs will turn on under the micro's control while the others – a minority – will not do anything.

Thinking it could be the user port socket, I checked for bad connections or cracked tracks, neither of which could I find. I suspect that the user VIA – IC69 – is somehow broken.

Please could you help me? If you think it is the User VIA can you give me details of where I can buy one it and how much it will cost, or can you offer some other method of repair? I have rung a local computer repair shop and to send the micro in will cost a set charge of `46. This seems rather expensive and I don't wish to lose the micro for two to three weeks. – **Tim Boughton (age 13), Harrogate, N.Yorks.**

● *One simple way to test the user VIA is to swap it – the BBC Micro has two 6522 VIAs. One handles the user and printer ports and the other handles the system components like the sound chip, joystick fire buttons and keyboard. This system VIA is IC3 next to the cable that attaches the keyboard. Swap the two VIAs and test your system again.*

If the user VIA is faulty the micro may not work at all as it can operate without the user VIA but not without the system one.

Replacement chips for the BBC Micro are often advertised in The Micro User *and one source for the 6522 is Watford Electronics.*

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Erik's a real collector's item

The Mad Hatter begins a step by step solution to a humorous adventure

I AM going to offer you an inside look at one of the lesser known adventures by Level 9 – *Erik the Viking*, which was published by Mosaic, 187 Upper Street, London N1 1RQ and marketed by John Wiley & Sons Ltd, Baffins Lane, Chichester, PO19 1UD. Why include such detail? Well, you can't get it direct from Level 9, and while it's an old, tape-based adventure it is well worth trying to get hold of, particularly since it was, I think, the first of the Austin brothers' illustrated adventures.

Erik the Viking was a game-of-the-book production based on Monty Python team member Terry Jones' story which, incidentally, was recently released as a spectacular and very funny film – though the screenplay and the book differ quite a bit. Accompanying the tape is a booklet giving an outline of part of the book's plot and some hints on how to proceed.

The treatment of **Erik** which follows is thanks to Matthew Hall, who sent in some hints, and Tony Marter who sent a superb solution combining logical and pictorial maps.

Before I start the detailed solution, one tip from Matthew is worth mentioning – because it is useful in all adventures. Remember, he says, to take *everything*.

I know that occasionally objects are lavishly strewn around adventure scenarios to provide atmosphere – **Village of Lost Souls** is a classic example of this – but even then the objects *may* just turn out to be useful, if only for mapping an inventory-dependent maze.

My own tactic – where I suspect that not all objects are useful – is to create a dump somewhere in the middle of the adventurescape. Then I can amass a single collection of artifacts

and I can try them out as potential puzzle-solvers without having to search my memory (or my notes) to think where that wretched hairpin was found when I am confronted with a locked door that might respond to a burglarious approach.

So, off we go: Erik (you, dear reader) starts off on a mountainside on his way to the homestead – where he'll discover that his family has vanished – and he needs to pick up the first items. The sequence is D, W, S into the barn where the whetstone and kindling are, then N, W and W through the farmyard to the kitchen.

Empty the stewpot here to produce the helmet, mutton and bear sinews – all useful items. Now go S into the Great Hall and E on to the platform and search the rushes to find Blueblade, your trusty sword. The trestle table found here will also be useful later for a little bit of shipwright's work.

Now go D to reach the furs on the bench and search them to find the horn – which you must blow to summon your friends. Go back up to the platform, then W and N to the kitchen and E, and N to the smithy. Take the scales, hammer and nails.

Next go N, W and NE to the boathouse. If you have not done so before, blow the horn to call your friends, examine the boat and give it a push to launch it. I found the most useful input for boarding ship was IN, but ON will also serve.

When you find your ship is sinking, hit the trestle table with the hammer to produce some planks and then mend her with the hammer, planks and nails. Below deck you'll find some deer antler skates and a medallion, on deck is a cloth sail and the open sea lies to Westward – and that's where we'll leave things for now.

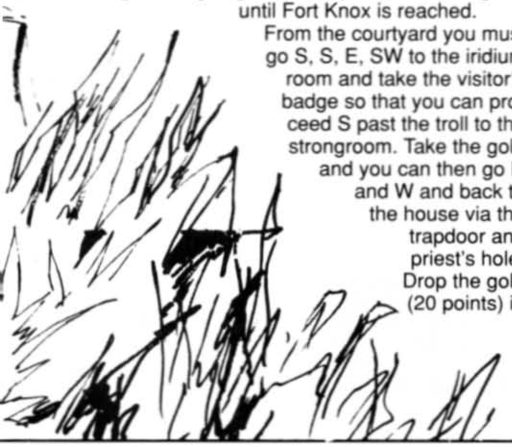
To be continued...

Signs of the time

In this part of Colin Jack's **Programmer's Revenge** we shall encounter a nasty type of maze – that can't be mapped by dropping objects. First, however, leave the house via the front door and take the route to the bridge mentioned in the December issue.

When you get to the umbrella after the picture don't forget to take it again before crossing the bridge and going to the T junction. Now go N until Fort Knox is reached.

From the courtyard you must go S, S, E, SW to the iridium room and take the visitor's badge so that you can proceed S past the troll to the strongroom. Take the gold and you can then go D and W and back to the house via the trapdoor and priest's hole. Drop the gold (20 points) in the trophy room and then go to the hall. Discard the badge and umbrella and take the knapsack instead.



Now it's time for an aerial excursion: Head N to the crossroads and then follow the route to the canyon given in the November issue. From here go NW to the Stupefying Drop, check that you are wearing the knapsack and JUMP.

You'll parachute down to the desert, and the route through the maze is S, NE, W, NW, S, and NE, enabling you to continue S to the pyramid picture. You need to make a note of the inscription UBZNEPFOET XUB JISI.

Now go N and then keep going E until you are in the pyramid and find the amulet – this is both a tool and a treasure. Go W to the edge of the desert and then N, W, SW, SE and S. From here you climb up the cliff, W and then up twice to the top and return to the driveway.

From the driveway move E, S, SE and E to the copse, then S, S, W and S into the pavilion. South through the mirror takes you into the first time zone – and it's the amulet which enables you to use the time gate.

Now go E and NW to the signpost picture and NW, W, S, S, S into the house, then W and take the globe from the trophy room. Now make your way to the hall and SAY MGWRMPH (remember the tramp?) to the programmer. You can now take the watch and retrace your steps to the pavilion by moving N, N, N, E, SE, SE and W.

If you move S now you'll find yourself in the second time zone. Move E, NW and W into the olive grove and then N, NE and E and TAKE OLIVE. Now you can go up, N, SE, and N to Mount Olympus and take the *pomegramete* (well, that's how they spell it) then go W and drop the olive as it's no longer needed.

Move W, S, and SW to the clearing and take the golden fleece before going NE, W, SE, SE and W to return to the pavilion. You can now go S into the third time zone and proceed E, NW W on to the glacier, then S, SE and SW to take the tusk. From here up, N, SE, SE and W finds you back at the pavilion with full hands.

How to get back safely and the final section of the adventure will be dealt with next month. Until then, happy adventuring.

Curiouser and curiouser

A few readers are reporting odd goings on in **Elite** which are worth sharing with a wider audience.

Twelve-year-old P. Bennett uses a disc-based Master without the second processor turned on, has no extra roms or ram fitted and his disc drive has its own power supply. This suggests that what follows is due to the program – which he thinks is the latest version of **Elite**

As a Mostly Harmless Fugitive (I wonder what he'd been up to) there he was in Galaxy 1 about to hyperspace from Bemaera to Xeesle when he got caught in Witch Space. What is interesting, though, is that his short range chart suggested he was in the vicinity of Sotiqu some 30 light years further on.

After the usual dust-up with Thargons and Thargoids – which he survived – he found him-

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Problem Corner

Can anyone help K. Williams? He can't cope with the pterodactyl in **Temple of Terror.**

➤

self not only Clean but ELITE – and nary a Right on Commander in sight. How's that for instant promotion?

Gregg – no surname – has an old disc version and *he* also got pitchforked into Witch Space – for the first time, by the sound of it. Attempting to hyperspace from Alace to Maonle, he reckons he was faced with about 50 baddies. He energy-bombed his way out of this predicament only to find himself unable to get out of Witch Space.

I wonder if he *did* actually check his close range chart, since normally you simply have to reset the cursor to a new destination and hyperspace out. Anyway, using his escape capsule got him back to Alace – so keep that in mind if you really are stuck in Witch Space.

Commander Joe-90 has sent in a long and fascinating letter about his encounter with our mystery ship. He was in Galaxy 5 near Ervele when he found himself unable to jump and thus detected the mystery ship.

He confirms that there was no image on the radar, the ship was very well shielded and both non-aggressive and totally non-responsive apart from firing three missiles in response to Joe's laser attack. Joe made a close inspection and rates the ship's size as about the same as a Cobra Mk III.

Joe also states that it is this ship which appears on screen at the start of the Master version when the prompt *Press space or fire* is displayed. He says that if you compare the radar displays when the approaching Cobra Mk III is shown on screen at the start of **Elite** and when the mystery ship is shown there is a difference. The Cobra throws a radar image – and the Mystery Ship does not.

It's time we thought up a suitably reptilian name for this ship – over to you for suggestions.

Joe adds, in reply to Martin Cartwright, that asteroids can be found regularly in Galaxy 2 in the vicinity of Beused, Arines and Quenle. Lastly he points out that if you can keep the screen relatively free from scenery that needs continuous updating, things such as energy banks can be updated much more quickly – a useful tip after hard combat.

Hall of Fame

Congratulations to Alun Eynon-Evans of Cardiff for sending the first-ever solution to Firienwood.

S.R. Mansfield makes a plea that I echo from the heart – would some enterprising software house consider producing a version of **Elite** for the Archimedes that makes use of the machine's superb facilities? I have a 16-bit version which I sometimes play, but a 32-bit game with the kind of graphics that the Arc can handle would be out of this world.

Mansfield suggests that *some* people would get an Arc just so they could play a 32 bit version of **Elite** – and maybe that's not as daft as it sounds when you remember that yours truly bought Level 9's **Colossal Adventure** and *then* ordered a BBC Micro.

I'm sure it's not just Mad Hatters who occasionally do things back to front, since consultants in the business side of computing often say that you should work out what software you need, and only then buy the hardware to run it.

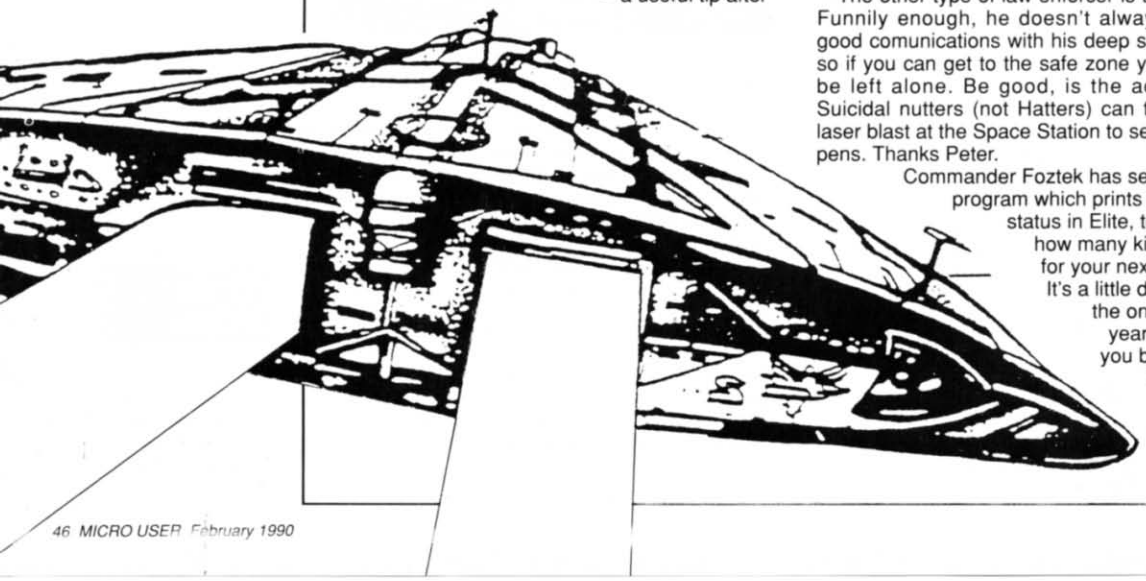
Finally – for this month, at least – Peter Clifton has some helpful comments on dealing with Vipers, those nasty police types who try to spoil the fun of harmless little traders like you and me. What, me officer? I never belted a Boa in my life.

Anyway, Peter points out that there are two sorts of Viper – the deep space variety and the local yokels. Committing a felony in deep space will often attract the unwelcome attentions of DSVs. They don't like you scooping up contraband cargo and will then shadow you discreetly – not unlike motorway speed cops, he says. Wonder how he knows?

Newcomers to **Elite** tend to treat every blip on the radar as yet one more pain in the rear but blasting away can produce unfortunate results. There you are a mere Offender one second and the next you are Fugitive with a swarm of Vipers eager to exterminate you closing in rapidly.

The other type of law enforcer is the local lad. Funnily enough, he doesn't always maintain good comunications with his deep space buddy, so if you can get to the safe zone you may well be left alone. Be good, is the advice here: Suicidal nutters (not Hatters) can try belting a laser blast at the Space Station to see what happens. Thanks Peter.

Commander Foztek has sent in a utility program which prints your current status in Elite, together with how many kills you need for your next promotion. It's a little different from the one I printed a year ago: Would you be interested in seeing it?



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On the menu

- Ballistix
- Pacmania
- Stryker's Run
- Duck!
- Snapper

Undocumented features

More help from Hac Man with your favourite games

WELCOME to another column packed with goodies old, new and recycled. Who said Hac-Man wasn't Green? We dive straight in this month with the passwords for Peter Scott's Ballistix, *shown below.*

The passwords for Ballistix

Thanks to Jonathan Hudson of Whitley Bay and Daniel Mitchell of Earls Colne, Essex, for these passwords. Daniel says that the game also contains a number of features that are not documented in the instructions:

- The magnets have a limited field of attraction, which is denoted by the diagonally-striped tiles. This patterned ground also acts as a slope if there is no magnet – see level 24 in two-player mode (RGBA).
- Some arrows are invisible. If you allow the puck to come to a stop in certain positions on later levels of the one-player game it will, for no apparent reason, move off suddenly of its own accord.
- If some arrows are pointing directly at the puck, right next to the bumpers, the puck can get pushed into the bumpers. You can move the puck off them only by firing at it from the side.
- The puck must be fully on an arrow tile for it to be affected by the tile.
- Throughout either type of game there are only two LEV+ tiles.

Daniel has also included some tips that may come in handy on the one-player game:

- When the puck is first thrown into the court, watch it to see where it goes. At times it may bounce out of the goal if it is going too fast – see level 19 in one-player mode (BACA).
- You can push the puck up over long lines of downward-pointing arrows by positioning your pointer directly underneath it – not to the side – and as near as possible without the arrow turning sideways.
- You can move the puck across the court in small steps by hitting it just off centre. This will jolt it upwards and gently to one side. Its sideways movement will soon tail off and it will continue its normal vertical movement, having moved only a small way across.
- The X tile, which prevents the other player from firing, obviously has no effect in the one-player game.
- On either game you can accelerate the puck upward while it is in a tunnel, because balls fired at it when it is out of sight will still affect it.
- On either game, don't try too hard to get the RICOCHET bonus. It is nearly impossible in the one-player game and not much easier in the two-player one. If you "collect" a letter that you already have this letter will be cancelled from your scoreboard. Consequently you need to be very careful with your aim when near to completing the RICOCHET.

Daniel also says that he cannot complete screen 29 of the one-player game because the game locks up as soon as a goal is scored. However, both Steve Hanson of Superior and Peter Scott himself assure me that is not the case, so it seems likely that Daniel's machine is fitted with a rom that is clashing with Ballistix.

More news as soon as I have any...

Three dimensional Pacman

WHEN a spectacular new machine such as the Archimedes, the Atari ST or the Commodore Amiga is first released it often takes a while for software to be written that really utilises the machine's power.

Often in the early lives of these machines we saw games and other programs that looked just like 8 bit offerings with more colours. Zarch is probably the outstanding example of what the Archimedes can do, but undoubtedly games programming will march on to a point where even Zarch looks ordinary.

One other game that could never be an 8 bit conversion is Grandslam's **Pacmania,** the latest escapade of Pac-Man, the character that spawned the above-mentioned Snapper and the inspiration for my own pseudonym. Kevin Foad, of Llanbradach, Mid Glamorgan has a number of hints, which follow, for anyone who may be having trouble with this game.

The purple ghost is the most persistent; when you get a power pill concentrate on chomping it. Try to get all the bonus items, especially the pills. When you get a green – speed up – pill, try to get a power pill, otherwise you will probably bump into a ghost and lose a life. Use the replay facility to have a sneak look at higher levels.

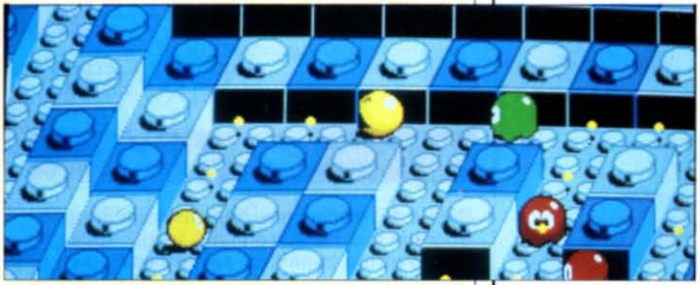
Kevin also tells me that he has just completed Pacmania and the reward is well worth all the effort. When you complete the last level Jungle, you are presented with a highly-detailed picture of an Olympic stadium populated by – in Kevin's words – millions of finely detailed ghosts. You also carry your score over to the next game, making it, I suppose, a continuation of the one you have just completed.

If, however, you find Pacmania too difficult, A. Shakoor of Hainault, Essex, has the solution. Put the Pacmania disc in the drive, exit to Basic and type the following:

```
*LOAD PACMANIA 10000

?&10234=x where x is the number of credits
?&102C8=x where x is the required number of
lives
?&113D4=x where x is the number of points
awarded per pill
```

Finally type CALL &10000 to start the game.



One player game	Two player game
1. ACPS	1. BZXL
2. LGCL	2. GAGB
3. RRRG	3. GRBA
4. BAGG	4. FCAA
5. BLGY	5. CLFC
6. GBTX	6. PYAL
7. PGCL	7. GJLP
8. PTLR	8. CLGJ
9. RRGE	9. LAGA
10. PTLG	10. GGJP
11. EGBA	11. AAPG
12. KGBL	12. SPAA
13. GYGB	13. EAEZ
14. AEGG	14. GJGS
15. LPLG	15. PYLG
16. BAGA	16. YLPK
17. ATKP	17. LPXA
18. LPAG	18. JPLA
19. BACA	19. CGYG
20. GAEA	20. BLPK
21. RGFG	21. LAJP
22. YAJL	22. FACG
23. TKPG	23. BAAG
24. FLPE	24. RGBA
25. GYAP	25. CALL
26. LLPJ	26. LGTG
27. GYAB	27. YGXL
28. LLGL	28. RRGZ
29. LRRR	29. GCPY
	30. ASPS

Duck!

The passwords for Superior's **Qwak!** are as follows:

1. No password
2. PURPLE
3. PLEASE
4. OFFICE
5. SOOTIE
6. DANGER
7. ARROWS
8. FORGOT
9. LONELY
10. PEOPLE
11. CANDLE
12. SHADOW
13. SISTER
14. INSIDE
15. BEFORE
16. DINNER
17. PLAYER
18. ORANGE
19. HORSES
20. PRUNES
21. ENAMEL
22. No password available
23. No password available
24. No password available

As indicated above, levels 22, 23 and 24 have no passwords. So to access screens 22 to 24 you must either play right from level 1 or jump to screen 21 and play through to screen 24 without losing a life.

Thanks to Steven Robson of Tynemouth, Tyne and Wear, John Crawshaw of Mevagissey, Cornwall and Kevin Finn of Sale, Cheshire for these passwords.

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The Stryker's run-around

One of the most popular games ever seen on the BBC Micro was Superior's **Stryker's Run** and, even though it is now over three years old, I still receive quite a few letters about it.

Readers with particularly good memories may remember that my May 1987 column featured extra lives pokes for the BBC B, Master 128 and Compact versions of the original game. In the January 1988 column I provided additional pokes for these routines to provide infinite lives. However, a fair bit of confusion seems to have been generated by the January article, which refers back to "...the Stryker's Run routines published in the May 1986 issue..."

I would like to apologise for the confusion and to state categorically that it was the May 1987 issue of *The Micro User* in which the Stryker's Run special appeared. To recap, that issue contained a full set of hints for the game and a conversion routine to allow the enhanced Master version on the original 5.25in disc to run on the Solidisk 256K 4 meg sideways ram board, in addition to the extra lives pokes described above.

Please note that the routines featured in the May 1987 issue are not suitable for the versions of Stryker's Run that appeared on the first Play It Again Sam. If you own the Compact 3.5in disc version of Sam 1, please refer to the May 1988 column; if you own Sam 1 on 5.25in disc, equivalent routines appeared in the very next issue, June 1988.

A version of compatibility

REGULAR readers may remember the **Snapper Upgrade** that I featured in my August 1987 column. For the benefit of anyone who has not seen it, it was a complete hack-around for the first game ever released for the BBC Micro.

It provided facilities such as pause/restart, sound on/off and quit game, that are included as standard in modern games, but which were almost never seen in games of Snapper's era. It also provided almost every conceivable cheat facility, including infinite or extra lives, a level jump and bonus lives at predetermined intervals.

I often mention that any poke featured in this column will work only on the version of the game for which it was written, and will almost certainly not work on any compilation version of the game.

At the time I wrote the Snapper upgrade the only versions of Snapper available were the three versions – two tape and one disc – released by Acornsoft.

However, Snapper has since been released on Superior's Play It Again Sam 7 compilation. Needless to say the program code has been changed, so that my Snapper Upgrade does not work on the new versions of the game. Indeed, I recently received a letter from M. Burrows, of Stanmore, Middlesex, to this effect.

Fortunately the basic program code of the Sam 7 versions of Snapper is almost identical to that of the originals, so the Sam 7 versions need only loading routines alternative to those I wrote for the original games.

To make the Snapper upgrade work on the Sam 7 versions of Snapper, proceed as follows:

First of all, type in Listing 1 from the August 1987 column exactly as printed, then spool it to one of your own blank tapes or discs under the filename SNAPUP.

Next, put the Snapper tape into the cassette recorder or the Sam 7 disc into the disc drive and type:

```
*INIT (5.25in disc versions only)
*MOUNT (Compact 3.5in disc only)
PAGE=&5000
LOAD"S-II3"
142 *TAPE
143 ?&4521=&60:CALL &4500
146 ENVELOPE1,4, 6,-3,-3,4,2,2, 0,0,-1,0,63,58
147 ENVELOPE2,3, -4,-1,2,6,6,28, 81,-4,-5,-
1,126,63
210 ENVELOPE3,1, 0,0,0,1,1,1, 126,-4,-1,-4,
126,0
220 CALL &3400
```

Next, put your own tape or disc back into the drive and type:

```
*MOUNT (Compact only)
*EXEC SNAPUP
```

Disregard the two *Mistake* messages at the start and end; they are meaningless. Now replace your own tape or disc with the original and type:

```
*MOUNT (Compact only)
RUN
```

and follow the on-screen instructions.

As may be indicated above, for the first time in my experience, all three versions of a game – tape, 5.25in disc and Compact disc – feature loading routines that are, for my purposes, identical. Thanks to the programmer, Chris, who converted the software.

Incidentally, some readers may be interested to know that two bytes from the original Mark II Snapper have been changed in the Sam 7 version. I have not yet discovered their significance, but if you type in the following line:

```
141 ?&200F=&3D:?&2013=4
```

either as part of the above modifications or by itself, you will have an exact duplicate of the original Acornsoft Mk.2 Snapper. If anyone notices any differences, please let me know

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Sweet success

The steamy tropical island of Papua New Guinea is as unlikely a setting for serious Archimedes software as anywhere in the world. But it provided inspiration for a winning entry in *The Micro User* Innovation Awards 1988. The project continues and here we look at its background and future.

Tony Leah discovers how an innovative use for the Archimedes has survived

THE highly-praised sugar plant simulation program which drew admiring crowds when it was demonstrated at the Christmas 1988 Electron and BBC Micro User Show, was based on Graham Steven's experiences as an engineer on sugar estates in Papua New Guinea. With his son, Matthew, the programming team from Hampshire walked off with first prize in the Archimedes section of the competition with their cane sugar plant processing simulation.

And it also owed a lot to the fact that Graham, who loathed micros when he first encountered them, grew to love computing when he was stuck in a TV-less jungle with a BBC Micro. He had earned an electrical engineering degree during his 13 years service in the Royal Navy. To get that qualification he had to become involved in computing for the first time.

"We used an IBM 1132 mainframe for calculations, and it was so desperately unfriendly it nearly put me off computers for life", Graham recalls. "Fortunately, just before I left the Navy I attended a course at Swansea University in 8008 microprocessors and that helped cure my phobia".

After leaving the Navy with the rank of lieutenant in 1979, Graham worked for four years as a consulting engineer in Manchester. Then he joined Booker Agriculture International as an electrical engineer, commissioning and working on sugar plantations in Papua New Guinea and Sri Lanka.

"I bought my first BBC Micro in 1983 while I was living in New Guinea", said Graham. "Even though it was VAT-free I remember it still cost me in excess of £500. I'd owned other 8 bit micros, but I always wanted something more than games and word processing. The BBC Micro opened up the door to serious programming for me because right from the start I was quite happy working in Basic".

He found himself not alone, even in remote New Guinea, with his BBC Micro. "One of the reasons for buying this particular machine was that it was used in schools, and my children would find it useful when they visited me in their holidays", said Graham. "I soon disovered there were other BBC Micro users on the island.

"The local education authority was very well equipped with Acorn machines and the British-staffed College of Technology also had BBC Micros, so there was no shortage of people to talk to and get help from. This was particularly valuable when problems on the local electrical system resulted in blown chips. It meant I was able to get my machine fixed without having to send it back to the UK".

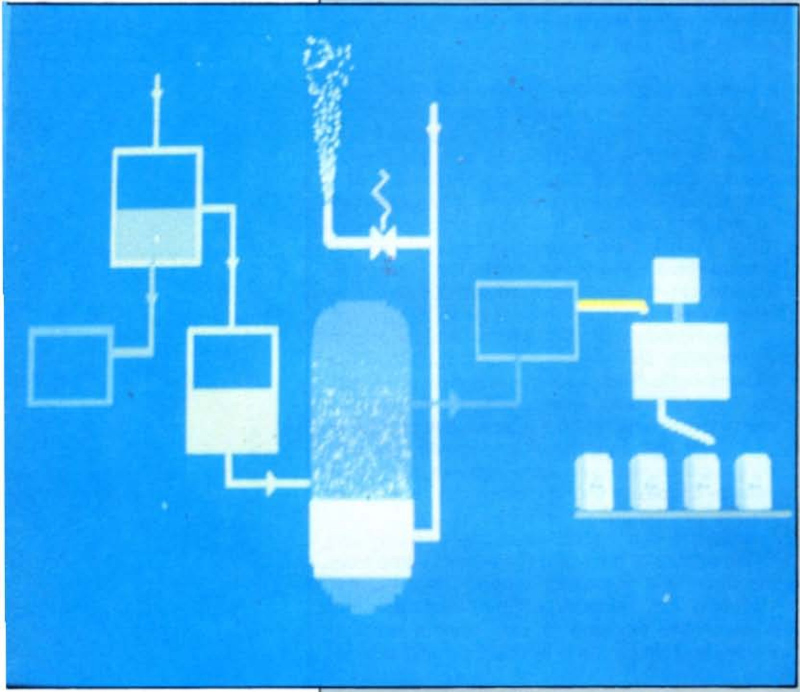
To complement his BBC Micro, Graham bought a Wordwise chip and a printer in 1984. "The ribbons came from Australia and cost a fortune, so they were used very sparingly", he said. "I didn't feel I could afford a disc drive at that time, so I spent £90 on a Hobbit end-to-end tape cartridge which had very slow access but could search. It doesn't sound much today, but at the time it was the answer to a prayer".

Graham found the BBC Micro stood up very well to the rigours of the tropical climate. "Aside from the unreliable electricity supply, I had no real trouble at all", he said. "I had to plug up all the holes in the machine to stop spiders crawling inside, and occasionally dismantle it and vacuum

➤

Mathew and Graham Steven with the equipment they use for the simulation out the insects that did manage to get in despite my best efforts. But that was all – the machine didn't seem to mind the heat and humidity one little bit".

As there was another BBC Micro on site where he worked, Graham began to devise practical computing exercises. "I designed maintenance schedules and that sort of thing", he said, "simple instructions which could be printed out for the workers. But by no stretch of imagination could I call myself a programmer in those days. All that came much later".



The screen display while the simulation is running

> *One of the programs is to allow plant operators to achieve economical production through correctly balanced material and energy flows*

After more than three years in the tropics, Graham returned to Manchester where he studied for his MSc at UMIST. "I bought a Vine Micros matrix rom in support of my work for the Master's degree", said Graham. "There was a whole suite of BBC Micros at UMIST and I made a conscious decision to produce my dissertation on the BBC Micro which, with the addition of the drawing program Diagram II from Pineapple Software, worked out very well".

By the time Graham got his MSc in March last year he'd learned a lot more about programming. The idea for a sugar processing plant simulation had been exercising his imagination for some time and *The Micro User* Innovation Awards brought it to fruition.

"I originally began designing the simulation in order to try out the programming skills I had picked up", said Graham, "and also to test some theories that i had formed. The project was started on the BBC Micro and would probably have stayed there but for the fact that Matthew won an Archimedes in a competition designing a DTP newspaper on his school's machine, and obviously this fantastic new micro was too good for just playing games on.

"I must say that we found transcribing the program very simple – the Archimedes swallowed it whole. We used Clare's Artisan to build up the graphics Matthew had already designed and, although we didn't think we had an automatic winner, we felt it stood a good chance in the Innovation Awards".

In the event the program triumphed over many other excellent entries and won for Graham and Matthew a Brother 1709 printer. "We're very pleased with it", said Graham, "it gives excellent quality".

Highly original

Although it might appear at first to be rather esoteric, the sugar processing simulation is clever, highly original – if not unique – and attracted much interest from those who saw its continuous demonstrations at the Electron and BBC Micro User Show. One of the program's main purposes is to allow plant operators to achieve economical production through correctly balancing material and energy flows.

"Ideally you want to operate the plant at maximum throughput with the minimum use of oil and diesel fuels", said Graham. "The model is designed to allow the operator to continually assess plant performance and decide on the best production policy. It is written in Basic using the ARM Basic Editor, so additions and corrections are quite straightforward. Calculated process variables are simply superimposed on the prepared screens.

"Process variables are calculated iteratively at one second intervals. The Archimedes will cycle through each program loop approximately 10 times a second, updating screens at 10 times actual plant rate – very useful for predicting ahead.

"Nobody, as far as I know, has previously written a program simulating the entire sugar-making process.

"As an exercise, it was very satisfying – and I mean apart from winning the competition. We made a lot of contacts at the show and got all sorts of ideas for developing the program, for instance as support for geography and science projects in schools. We also had inquiries from people in university education.

"Ultimately we'd like to develop the program commercially for both education and materials processing, though we realise it is rather specialised. But I've a lot of ideas about tank levels and materials flows which could enable the program to be adapted to run other things.

"I've already developed an optimisation routine which will set up plant control variables dependent on the relative cost/penalty values of oil, diesel, reduced production rates and so forth. This is awaiting transfer from the BBC Micro to the Archimedes".

That job could take some time. "Matthew is a boarder at Kingswood School in Bath and the Archimedes goes everywhere with him", said Graham. "So I only get to work with it during school holidays".

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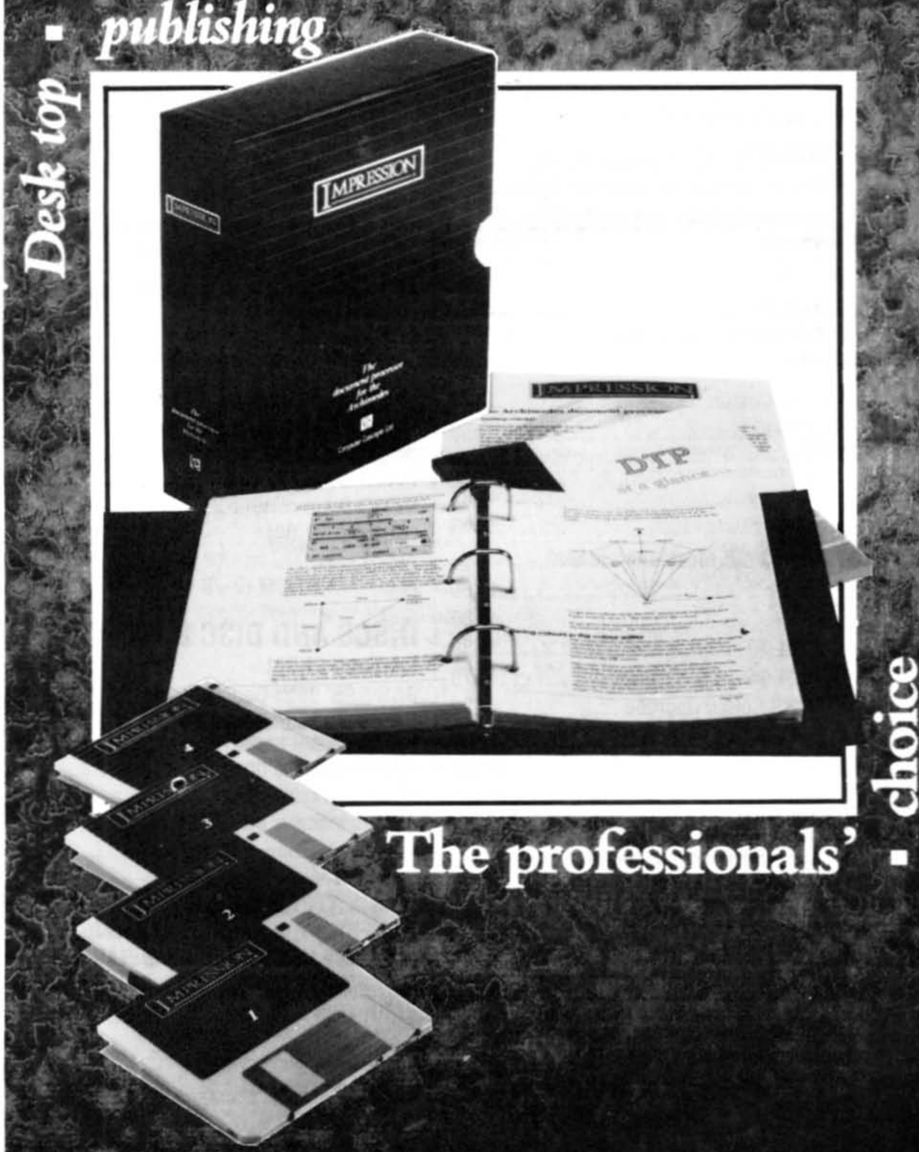

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If other programs can offer all these features, then they might be as good as Impression.

Breaking down the barriers

Mark Smiddy meets a publisher with a difference...

STEVE Graham is only 12 years old and suffers from cerebral palsy. But he hasn't let these twin problems prevent him from becoming a magazine publisher. Like any young computer nut, Steve is ambitious, creative and fascinated by the latest gadgetry.

Unlike most other enthusiasts, though, Steve has to cope with athetoid cerebral palsy, a condition which causes spastic or jerky movements in the limbs, poor coordination and a disturbance of growth and development.

It's caused when an injury to the brain's cortex extends into the basal ganglia. Generally speaking, a cerebral palsied child is born once in every 500 births in the UK.

Steve's magazine – called simply Computermag – is aimed mainly at BBC Micro and Electron users. Launched in July last year, it contains news, features, puzzles and listings – and costs just 10 pence. All proceeds go to the local Spastics Society in Redcar, Cleveland.

The idea for the magazine grew from the local computer society's monthly newsletter. Its editor, technical support manager for Sapphire Office Systems Nigel Bean, told *The Micro User*: "Steve's quite a remarkable guy.

"We set him a difficult problem at one meeting, and he got the answer long before the next. I'm not talking about short programs with simple solutions – Steve can understand some very complex material indeed. He's better at it than the rest of us in many respects".

Perversely, a high level of intellect is not unusual among cerebral palsied people, although the poor coordination of facial expressions often leads people to believe sufferers to be mentally retarded.

When I met Steve he was in his room busily preparing the latest issue of Computermag. Greeting me with a smile he explained how the magazine is produced.

"All the programs are written and tested on my BBC Micro and printed on my Citizen correspondence quality printer", he said. Steve doesn't care for abbreviations like NLQ.

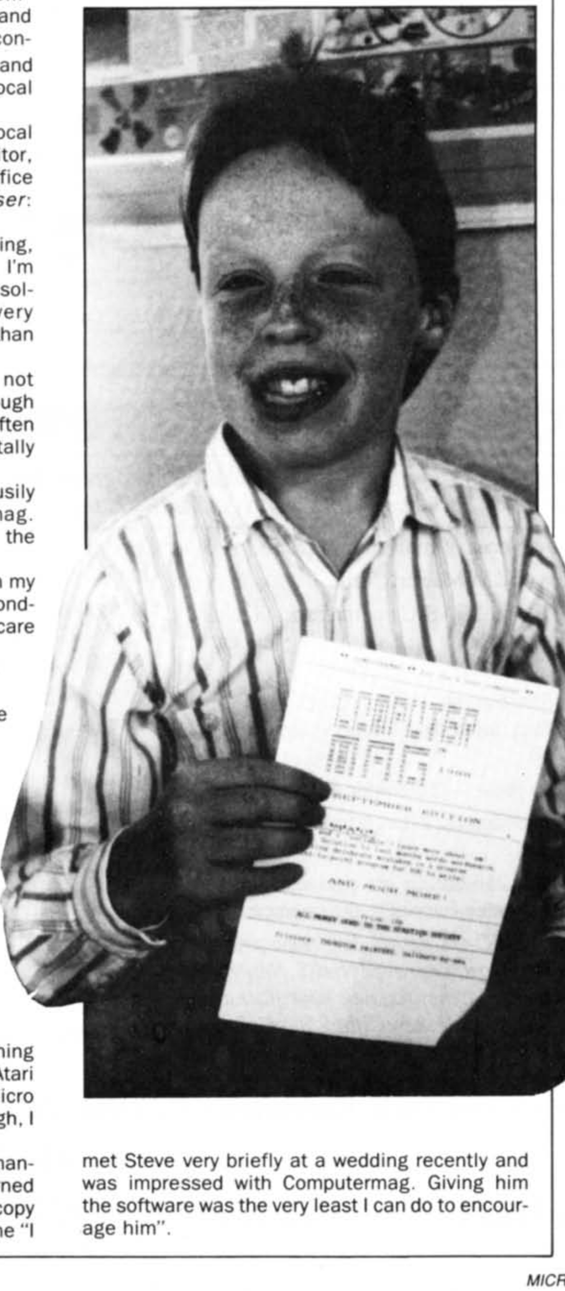
"I don't have a word processor yet. I make do with an electronic typewriter which does the job quite well. The blocks of artwork have to be filled in by hand afterwards".

Steve has been programming the BBC Micro in Basic for almost four years and even has a rudimentary knowledge of 6502 assembly language. "I love programming", he says, "but the problem is that I know more now than my teachers. They aren't stupid, they just don't understand micros like I do".

So what's next on the agenda? "I'd like a mouse and an art package – so I can do my drawings on the micro", said Steve. "Then I can print them out – they look so much better done that way".

What did he think about the desktop publishing revolution on 16 bit machines such as the Atari ST and Commodore Amiga? "I like the BBC Micro – it's easy to use", he said. "Then again, though, I wouldn't mind an Archimedes".

So impressed was Peter Leighton – sales manager for Grend Marketing – when he learned about Steve's achievements he gave him a copy of Mirrorsoft's Fleet Street Editor. Peter told me "I met Steve very briefly at a wedding recently and was impressed with Computermag. Giving him the software was the very least I can do to encourage him".



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Shareware 5: Fifty-one pieces of music for Maestro.

Shareware 11: Six concerti in Maestro form.

Shareware 12: Rubik's cube, BASIC compressor, Sinclair QL disc reader, Central heating calcs, Making cassette inlays, Floppy drive speed test, Address book.

Shareware 13: Hard disc backup, Rubik's clock, Interrupt module, Dustbin, Outline processor, Mandelbrots, Video database, Calendar, Golf.

Shareware 14: 'Arctist Plus' – 256 colour art package.

Shareware 15: 14 graphics demos, 2 !Draw fonts, 6 !Maestro tunes, 20 Sampled sounds.

Shareware 16: (another) 256-colour art package, link to Psion organiser, YAIG-2 game (works in the overscan).

Shareware 17: *Acorn's RISC-OS extras disc: new printer drivers; new version of !65Host; improved NetFS, NetPrint, NetFiler and NetStatus; IRQ latency fix; new hourglass and sound modules; WimpUtils module; new Clib (3.50), Colours (0.52) and FPEmulator (2.80).*

Careware 1: Calendar, Label printer, "Make" utility, Othello, Sliding block puzzles, Simon, + demos & games.

Careware 2: Asteroids, Backgammon, Fractal curves, Desktop Calendar, ARM disassembler, Disc editor (ADFS/MS-DOS), BASIC editor icon, BASIC program compressor.

Careware 3: Breakout, Fruit machine, 3D O's&X's, Forth language, HD backup, Graphical file dump, 'Exam-ine' for MS-DOS, and (another) icon for BASIC editor.

Careware 4: Graphics animation by Malcolm Banthorpe, serial link to BBC micro, dustbin, !PCdir – transfer to and from MS-DOS, screen blanking routine, WP file con-version routines, function key strip printer, some more tunes for use with Maestro and some desktop demos.

Careware 5: *Printer buffer module, Sinclair QL utilities, four overscan screen modes, Presentation program (bar charts, pie charts, line graphs, etc), Teletext screen editor, BBC font designer, key strip editor, 32,768 colour demo, GMA demo, poker, quartet (desktop game), Simon.*

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Captivating contents

Andrew Cumming reveals the secrets of good index presentation

THE first, vital, impression of a report or article's quality is often conveyed by its contents page. But producing such pages to a professional standard has been both difficult and time consuming on most popular BBC Micro word processors. Now all has changed. Using this utility you can easily produce well-presented contents pages and indexes for your documents.

Within Mini Office II and Wordwise it is possible to fully indent so that the text is on the left of the page and the page numbers aligned with the right margin. In View not even this is possible, and the numbers have to be separated from the text using either tabs or spaces. Using any of these methods though, the eye has to jump a large area of blank space from left to right and so may read the wrong page number.

If you look in most books, the contents pages have a row of dots separating the text from the page number, giving a path for the eye to follow. To do this in View or Wordwise, however, would require a great deal of time. And since this is a simple and tedious task it is ideal for a micro.

The program given here will do the job. Type it in and check it with Get it Right! then save it. The program needs a text file to work from and this can be generated using any word processor or text editor. All you need is a list of the items and page numbers separated by a comma. For example:

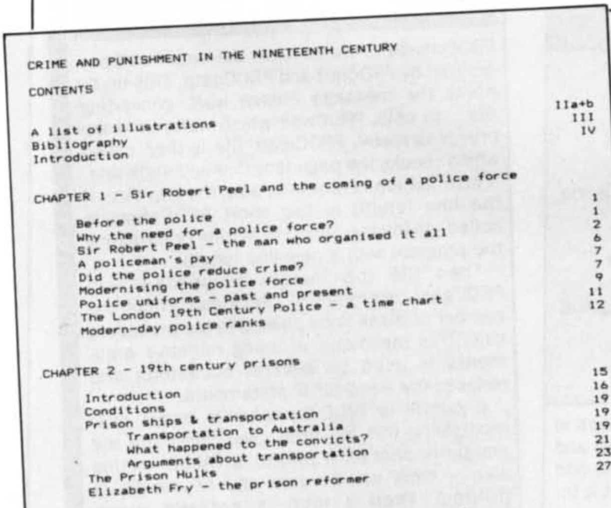
```
Chapter One,5
```

Any text is acceptable for the page number, so you can have numbers in words or in roman numerals if you wish – and tabs can be used to indent text. Any lines without a comma will be printed as they are typed – for headings or blank lines to separate sections. If you want to include a heading with a comma, it should be preceded by >.

When you have finished save the file to disc. If using View make sure that there is not a blank line at the end of the file unless one is required.

Now enter Basic and chain the program. A catalogue of the disc – or current directory in

➤



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CRIME AND PUNISHMENT IN THE NINETEENTH CENTURY

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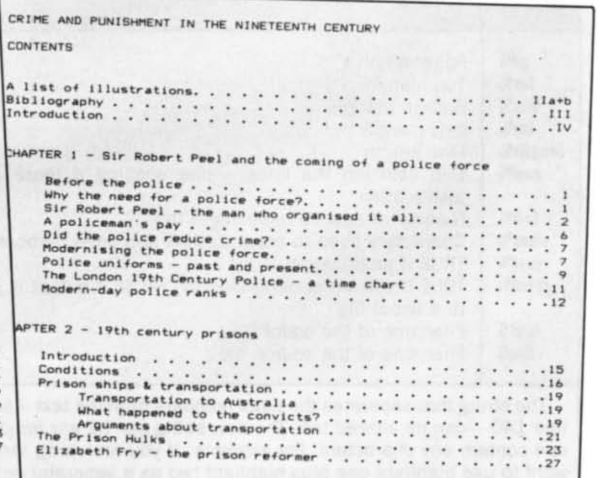

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```

. . . and without dots

➤

ADFS – will appear and the program will ask for the name of the text file. Once it is entered the program checks that the file exists and asks if it is to be printed or send it to a spool file which can then be loaded back into the word processor and edited. Simply type S or P. If the output is to go to a spool file the program will ask for a filename.

The next prompt asks you if you require vertical justification: Similar to horizontal justification, where spaces are added between words to make the end of the lines line up at the right margin, vertical justification is where extra lines are added so that the text on the page is stretched between the top and bottom margins. Professional publications use this, but fractions of a line – which look much neater – rather than whole lines are added to make columns of text fill a whole page.

This program uses a slight variation so if your original file will fill less than a page it's worth experimenting. Sometimes justification will improve things, sometimes not.

Depending on whether you are justifying or printing, you will be asked to enter the page length, top margin, bottom margin and left margin. If you are going to edit a spool file in a word processor you can add any left margin there.

If you are not justifying, you will be asked to enter the number of blank lines left between each line. Enter zero for single spacing, one for double spacing and so on. Next enter the line length

At the following prompt press 1 to use spaces to separate the text and page number or 2 or 3 to use full stops. Option two seems to give a more spaced-out effect, but it's best to experiment.

Any tabs entered in the source file will be translated into a number of spaces, depending on the number entered at the next question. This allows different indents to be tried.

The printing or output to a spool file then begins and the program firstly checks the source file, making sure that no lines are too long for the line length and, if you are justifying, that there aren't too many lines for the page length. It also calculates the gap needed for justification.

If you are not justifying, and printing a file that is too long for one page, it will pause after each page so that another sheet of paper can be fed into the printer.

Any spool file produced can now be loaded into a word processor. Note that if you are using View it should be read in, as this strips out all of the Ascii 10 codes. In Wordwise, these codes will appear as | characters which can be deleted.

➤

CUSTOMISATION

If you always use a particular line length or a particular size of paper the program can be altered to cut down the number of questions that need to be answered. All the variables are assigned a value of zero in PROCinit and are set in PROCdata, so to set a permanent value alter it in PROCinit and delete the question from PROCdata.

For example, to set the page length to 70, change line 130 so that *pl%* equals 70 and delete line 260. The variables that can be altered are:

Variable	Meaning
pl%	Page length
tm%	Top margin
bm%	Bottom margin
lm%	Left margin
length%	Line length
gap%	Gap between the lines – line spacing if there is no justification.
tab%	Number of spaces replacing a tab
char%	Characters used to separate text and page number
just%	TRUE if justification is set
print%	TRUE if you are printing directly, FALSE if output is going to a spool file
text$	Filename of the spool file
file$	Filename of the source file

The string that separates the page numbers from the text – *sep$* in line 140 – can be altered too. The new string can be any length and can contain any characters. For example, if you are using View and want to use highlight one plus highlight two as a separator set it to:

```
CHR$(&1C)+CHR$(&1D)
```

In Wordwise, CHR$(2) – the green embedded command code – could be used so preceding a line with > to force the printing of it should never really be necessary.

At the moment the program does not add any printer codes to the text but FNline is where the line is formatted and here you could check for certain characters and switch on underlining or double width or any other facilities your printer offers. A much easier way, though, is to use a spool file and add codes in your word processor.

HOW IT WORKS

PROCcreate is called after the data has been defined by PROCinit and PROCdata. This firstly prints the message *Please wait, converting file...* or calls PROCwait which waits until the printer is ready. PROCread_file is then called which checks the page length, line length and, if justification is required, sets the gap size. If the line length is too short PROCabort is called, giving the option of exiting or rerunning the program with a new line length.

Then the top margin is printed with PROCgap(-tm%*print%). PROCgap prints the number of blank lines passed in the procedure call. This technique of using negative arguments is used on several occasions and reduces the need for IF statements.

If *print%* is TRUE its value is minus one, multiplying this by *-tm%* gives *tm%* and the margin is printed. If *print%* is FALSE – value zero – *hm%* will be zero and no margin is printed. Then a loop is entered which repeatedly calls PROCread–line which sets up *line$*, FNline formats it setting *char$* to " ", ".." or ". " depending on the value of *char%*. If the length of the number string is even, ". " is changed to " ." to ensure all the dots line up vertically.

Then the bottom margin, and any lines left from justification, are printed. The loop is re-entered if the file is longer than one page. Once the end of the file is reached the printer is switched off and all files closed.

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```
   10 REM Contents page
   20 REM by Andrew Cumming
   30 REM (c) The Micro User
   40 MODE 3
   50 ON ERROR PROCerr:END
   60 PROCinit
   70 PROCdata
   80 PROCcreate
   90 END
  100 :
  110 DEFPROCinit
  120 file$="":text$="":print%=0:just%=0
:char%=0:tab%=0
  130 pl%=0:tm%=0:bm%=0:lm%=0:length%=0:
gap%=0:end%=0
  140 sep$=",":num$="1234567890"
  150 all$="ABCDEFGHIJKLMNOPQRSTUVWXYZab
cdefghijklmnopqrstuvwxyz*#$."_"
  160 mark$=STRING$(79,"-")
  170 ENDPROC
  180 :
  190 DEFPROCdata
  200 LOCAL ch
  210 CLS:OSCLI("CAT"):PRINT '"Please e
nter the source filename : ";:file$=FNin
put(all$+num$,10)
  220 ch=OPENUP(file$):CLOSE#ch:IF ch=0
VDU7:PRINT "File not found."'"Press RE
TURN to continue...":REPEAT UNTIL GET=13
:GOTO 210
  230 PRINT '"Print immediately or gene
rate a SPOOL file (P/S) ? ";:print%=CHR$
(ASC(FNinput("pPsS",1))AND 223)="P"
  240 IF NOT print% PRINT '"Please ente
r the filename of the SPOOL file : ";:te
xt$=FNinput(all$+num$,10)
  250 PRINT '"Vertical justification (Y
/N) ? ";:just%=CHR$(ASC(FNinput("YyNn",1
))AND 223)="Y"
  260 IF just% OR print% PRINT '"Please
 enter the page length : ";:pl%=VAL(FNin
put(num$,3))
  270 IF print% OR just% PRINT '"Please
 enter the top margin : ";:tm%=VAL(FNinp
ut(num$,3))
  280 IF print% PRINT '"Please enter th
e left margin : ";:lm%=VAL(FNinput(num$,
3))
  290 IF just% OR print% PRINT '"Please
 enter the bottom margin : ";:bm%=VAL(FN
input(num$,3))
  300 IF NOT just% PRINT '"How many lin
es between each item ? ";:gap%=VAL(FNinp
ut(num$,2))
  310 PRINT '"Please enter the line len
gth : ";:length%=VAL(FNinput(num$,3))
  320 PRINT '"Use (1) spaces, (2) '. .
.' or (3) '...' to seperate the descript
ion from the"'"page number (1/2/3) ? ";:
char%=VAL(FNinput("123",1))
  330 PRINT '"How wide should a tab be
? ";:tab%=VAL(FNinput(num$,2)):PRINT
  340 ENDPROC
  350 :
  360 DEFFNinput(valid$,max)
  370 LOCAL a$,a:a$=""
  380 a=GET:IF a=13 AND a$>"" =a$
  390 IF a=127 AND a$>"" a$=LEFT$(a$,LEN
a$-1):VDUa:GOTO 380
  400 IF LENa$=max VDU7:GOTO 380
  410 IF INSTR(valid$,CHR$a)=0 VDU7:GOTO
 380
  420 a$=a$+CHR$a:VDUa:GOTO 380
  430 :
  440 DEFPROCread_line
  450 LOCAL char:line$=""
  460 REPEAT
  470 char=BGET#ch
  480 IF char=13 GOTO 500
  490 IF char=9 line$=line$+STRING$(tab%
" ") ELSE line$=line$+CHR$char
  500 UNTIL char=13
  510 ENDPROC
  520 :
  530 DEFPROCcreate
  540 IF NOT print% PRINT ''"Please wai
t. Converting file."'mark$ ELSE PROCwai
t
  550 PROCread_file:IF max_length%-LENse
p$+2>length% PROCabort:GOTO 540
  560 IF print% VDU2 ELSE OSCLI("SPOOL "
+text$)
  570 PROCgap(-tm%*print%)
  580 count%=0
  590 REPEAT PROCread_line
  600 IF print% PRINT STRING$(lm%," ");F
Nline; ELSE PRINT FNline;
  610 count%=count%+1:IF just% IF count%
<lines% FOR loop%=0 TO gap%:PRINT:NEXT
  620 IF NOT just% FOR loop%=0 TO gap%:P
RINT:NEXT:count%=count%+gap%
  630 UNTIL EOF#ch OR pl%-bm%-tm%=count%
  640 IF print% AND EOF#ch AND count%<pl
%-bm%-tm% PROCgap(pl%-tm%-count%-bm%-end
%)
  650 PROCgap(-end%*just%+print%*-bm%)
  660 IF NOT EOF #ch PROCwait:GOTO 570
  670 *SPOOL
  680 CLOSE#ch:VDU3
  690 PRINT mark$''"Finished."
  700 ENDPROC
  710 :
  720 DEFFNline
  730 IF LEFT$(line$,1)=">" =RIGHT$(line
$,LENline$-1)
  740 IF INSTR(line$,sep$)=0 =line$
  750 LOCAL left$,right$
  760 IF char%=1 char$="  " ELSE IF char
%=2 char$=". " ELSE char$=".."
  770 right$=RIGHT$(line$,LENline$-INSTR
(line$,sep$)-LENsep$+1)
  780 left$=LEFT$(line$,LENline$-LENrigh
t$-LENsep$)
  790 IF LENright$ MOD 2=0 AND char%=2 c
har$=" ."
  800 line$=left$+STRING$((length%-(LENr
ight$+LENleft$))DIV2,char$)+right$
  810 IF LENline$<length% line$=left$+"
"+STRING$((length%-(LENright$+LENleft$))
DIV2,char$)+right$
  820 =line$
  830 :
  840 DEFPROCread_file
  850 LOCAL no%:lines%=0
  860 ch=OPENUP(file$)
  870 max_length%=0:REPEAT
  880 no%=0:REPEAT no%=no%+1
  890 UNTIL BGET#ch=13
  900 IF no%>max_length% max_length%=no%
  910 lines%=lines%+1
  920 UNTIL EOF#ch
  930 PTR#ch=0
  940 IF just% AND lines%>pl%-bm%-tm% VD
U7:PRINT STRING$(79,"-")'"The file is t
oo long to fit onto the page!":CLOSE#ch:
END
  950 IF just% gap%=(pl%-tm%-bm%-lines%)
/lines%:end%=(pl%-tm%-bm%-lines%) MOD li
nes%
  960 ENDPROC
  970 :
  980 DEFPROCabort
  990 VDU3,7:CLOSE#0
 1000 PRINT "The line length is too shor
t!"'"Re-run using a new line length of "
;max_length%" ? ";
 1010 IF CHR$(ASC(FNinput("YyNn",1))AND
223)="N" CLS:END ELSE CLS:length%=max_le
ngth%
 1020 ENDPROC
 1030 :
 1040 DEFPROCgap(a%)
 1050 IF a%>0 FOR loop%=1 TO a%:PRINT:NE
XT
 1060 ENDPROC
 1070 :
 1080 DEFPROCerr:VDU7:CLS
 1090 REPORT:PRINT" at ";ERL
 1100 ENDPROC
 1110 :
 1120 DEFPROCwait
 1130 IF NOT print% PRINT mark$
 1140 IF print% VDU3:PRINT mark$:PRINT
"Press RETURN when the printer is ready
...":REPEAT UNTIL GET=13:PRINT mark$:VDU
2
 1150 ENDPROC
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 5016 6
  50 = C490 A
  60 = DEBB 9
  70 = FCB7 7
  80 = 36D4 0
  90 = FD2E 2
 100 = 9719 C
 110 = 344C F
 120 = 7C64 9
 130 = 2267 8
 140 =  F86 F
 150 = B314 8
 160 =  AF6 F
 170 = ED0F 2
 180 = 9719 8
 190 = 1640 E
 200 = D950 1
 210 = 9284 A
 220 = F30A 2
 230 = B1BD 8
 240 = C2EE 4
 250 = F735 5
 260 =  D6B 6
 270 = 34E7 7
 280 = 86CC D
 290 = 5742 D
 300 = 541B 7
 310 = 4E0A C
 320 = 9AB9 D
 330 = 32C0 3
 340 = ED0F 3
 350 = 9719 B
 360 = 9CDC 3
 370 = D470 D
 380 = 819A E
 390 = F606 D
 400 = 5DF5 4
 410 = A765 B
 420 = EB8A 3
 430 = 9719 6
 440 = DB72 A
 450 = D778 E
 460 = BFBA 8
 470 = 6C45 1
 480 = FE7D 3
 490 = 2552 7
 500 = A300 E
 510 = ED0F 8
 520 = 9719 A
 530 = 5655 7
 540 = 2C7A C
 550 = C5E5 A
 560 = 6AFF 6
 570 = 464D 7
 580 =  CFF F
 590 = E27A 5
 600 = E8B2 0
 610 = DD1C 4
 620 = 66DA 6
 630 = 96DC E
 640 = 58C3 D
 650 = 4C56 7
 660 = 9C90 F
 670 = 98F7 B
 680 = BE8D 8
 690 = 7F7C A
 700 = ED0F 3
 710 = 9719 3
 720 = 4EA9 F
 730 = F9AD 9
 740 = C315 8
 750 = B1C4 9
 760 = 9F63 A
 770 = 7198 D
 780 = 3421 4
 790 = F56E F
 800 = 67E9 9
 810 = 88C9 F
 820 = 49CE 7
 830 = 9719 F
 840 = D5BB F
 850 = E72E 0
 860 = 6AA5 6
 870 = 1761 B
 880 = 1242 7
 890 = 3969 4
 900 = 892C 0
 910 = 5864 F
 920 = B4EB B
 930 = 280B 3
 940 = 3D49 8
 950 = 3541 0
 960 = ED0F D
 970 = 9719 C
 980 = 51DD C
 990 = A784 F
1000 = 753B 6
1010 = 67CC 3
1020 = ED0F 5
1030 = 9719 1
1040 = D063 B
1050 = B0A8 7
1060 = ED0F 1
1070 = 9719 8
1080 = 7DEC 3
1090 = 752C 8
1100 = ED0F 2
1110 = 9719 4
1120 = A180 C
1130 = 8388 6
1140 = AD7A 8
1150 = ED0F D
```

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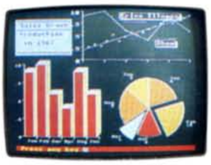
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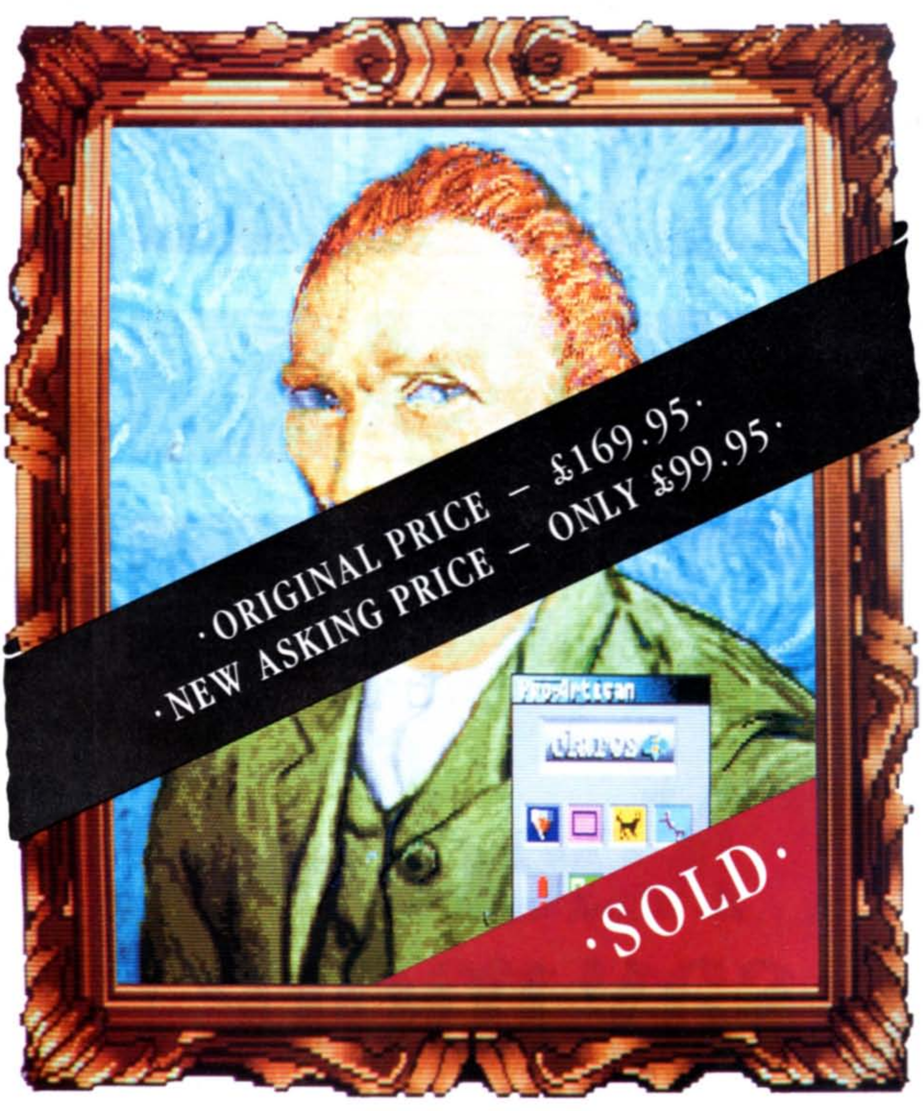
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Reprise for a hybrid

Product: Music 3000 Expander
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Tel: 0223 420360

Ian Waugh sounds his trumpet another eight times

AT the same time as Hybrid announced the suspension of the Hybrid Music System Junior, along it comes with a new module for the Hybrid Music System Senior – the Music 3000 Expander. The Hybrid Music System is a self-contained, fully integrated synthesiser and music composition system which runs entirely under the control of a BBC Micro apart from the Compact and 32 bit machines.

Astute Hybrid watchers will realise that the 3000 tag now plugs the gap in the Music X-thousand series. To recap briefly: The Music 5000 is the main unit – you need this in order to use the other modules – there is a Music 4000 keyboard and the Music 2000 Midi interface. The Music 1000 is an 8 watt stereo amplifier, suitable for powering bookshelf speakers, and it has three headphone sockets which makes it ideal for use in educational establishments.

Most regular HMS users, I'm sure, will have run out of voices at one time or another during music creation. The Music 5000 produces 16 channels of sound which are normally paired to give eight individual voices. The Music 3000 Expander doubles that number, adding another 16 channels/eight voices to the system.

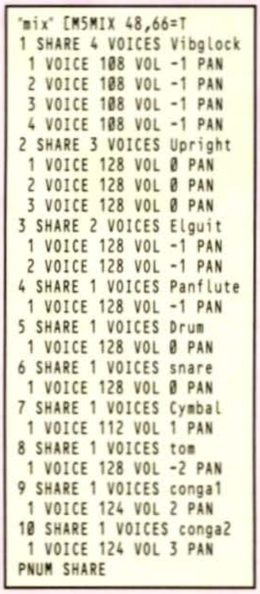
The unit is housed in the same beige-coloured casing as the other Hybrid modules. It is mains powered and connects to the system via the 1MHz bus. Like the Music 5000 and Music 2000, it has a 1MHz follow-on socket allowing the modules to be linked in any order while allowing other equipment to connect to the bus as well.

The audio output is provided by a stereo five pin DIN socket, as per the Music 5000. If your equipment has two stereo inputs or if you run the system through a mixer, you will now have control over four channels of sound. If you have a quad system you could produce some amazing 3D effects.

However, the vast majority of users will want to link the Music 3000's output to that of the Music 5000. This can be simply accomplished with a two-into-one lead and in case your soldering iron is a little rusty, Hybrid is adding such a lead to its product list at a price of £4.95.

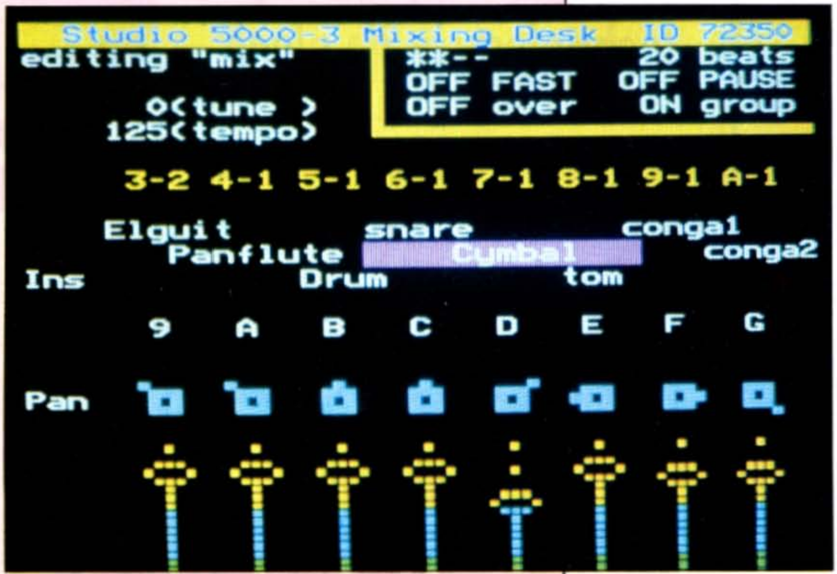
In use the Music 3000 is virtually transparent, in fact the review version was supplied without a manual – production versions will contain a short user guide – and it is one of the few pieces of music software or hardware which I have been

➤



```
"mix" [M5MIX 48,66=T
1 SHARE 4 VOICES Vibglock
 1 VOICE 108 VOL -1 PAN
 2 VOICE 108 VOL -1 PAN
 3 VOICE 108 VOL -1 PAN
 4 VOICE 108 VOL -1 PAN
2 SHARE 3 VOICES Upright
 1 VOICE 128 VOL 0 PAN
 2 VOICE 128 VOL 0 PAN
 3 VOICE 128 VOL 0 PAN
3 SHARE 2 VOICES Elguit
 1 VOICE 128 VOL -1 PAN
 2 VOICE 128 VOL -1 PAN
4 SHARE 1 VOICES Panflute
 1 VOICE 128 VOL -1 PAN
5 SHARE 1 VOICES Drum
 1 VOICE 128 VOL 0 PAN
6 SHARE 1 VOICES snare
 1 VOICE 128 VOL 0 PAN
7 SHARE 1 VOICES Cymbal
 1 VOICE 112 VOL 1 PAN
8 SHARE 1 VOICES tom
 1 VOICE 128 VOL -2 PAN
9 SHARE 1 VOICES conga1
 1 VOICE 124 VOL 2 PAN
10 SHARE 1 VOICES conga2
 1 VOICE 124 VOL 3 PAN
PNUM SHARE
```

A typical "mix" word using all 16 VOICES with six devoted to a percussion section



```
 Studio 5000-3 Mixing Desk  ID 72350
editing "mix"      **--          20 beats
                   OFF FAST     OFF PAUSE
      0(tune )     OFF over      ON group
    125(tempo)

    3-2 4-1 5-1 6-1 7-1 8-1 9-1 A-1

    Elguit        snare          conga1
       Panflute      Cymbal          conga2
Ins           Drum           tom

     9    A    B    C    D    E    F    G

Pan
```

The extra channels in the Music 3000 Mixing Desk

◄

able to fully understand without any documentation.

The controlling software comes on a system disc and the only noticeable change is found in the mixing desk. If you move the cursor off the right of the screen past the eighth channel, a second set of channels appears numbered 9, A, B, C, D, E, F and G. Letters are used as two-digit numbers wouldn't fit into the space above the faders. The first eight channels play on the Music 5000 and the second on the Music 3000.

The Music 5000 can support 10 players but most 5000 users probably don't use more than eight – as this coincides with the number of available voices. An extra player can be used as a tempo control track or to perform some other function in parallel with the music.

The Music 3000 doesn't increase the number of players but it allows a single music part to contain up to 12 voices. You could, for example, create a six or eight-note polyphonic piano part and still have lots of voices left for other music lines. A popular use will be the creation of large percussion sections, say a six-piece drum kit.

You can also use the extra channels for special effects such as Echo – which uses one voice per repeat – and to create multi-channel instruments – even a single, mega 16 channel sound.

The Music 4000 keyboard is fully compatible with the 3000 although the keyboard itself is only eight-note polyphonic.

A consequence of using extra voices means that most mix words will not now fit into the Notepad should you wish to edit them there. Time, perhaps, for Hybrid to release a more versatile editor.

Using the system to the full is likely to highlight another problem – lack of memory – and you will find that you can not enter multi-part pieces of any length. This complaint, however, must be levelled at the BBC Micro whose restrictive 32k ram is looking extremely diminutive next to that of 16 and 32 bit micros.

In conclusion, if you find the Music 5000's eight voices limiting but do not want to go the Midi route with the Music 2000, the Music 3000 is the answer. And it's the first unit to break Hybrid's traditional £161 price point.

SUMMING UP

The Music 3000 is quite transparent in use and provides the cheapest eight-voice expander on the market. However complex or lengthy pieces are liable to focus attention on the BBC Micro's shortage of memory.

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THE BEEB BODY BUILDING COURSE

Multicolour Micro

Mike Cook gives more details on how to use the Chameleon

WE looked last month at the hardware of the Chameleon and saw how it worked. Now let's see how to use it and what effects it can produce. If you remember, the Chameleon colour palette allows you to re-define the colours produced by your micro in terms of analogue red, green and blue components.

The great beauty of its design is that once initialised with a palette it needs no further software support. This means that Chameleon is compatible with every program ever written because the program never gets to see the hardware: It goes on working just as before, and only when the video signal leaves your micro does the Chameleon intercept and alter it.

The Chameleon can be operated in two basic ways – one where the program knows nothing about it, and the other where the software interacts with it. Let's look at the first way to begin with. Take any program – say a snooker game – where the colours available on the standard micro do not exactly match the ones in real life.

The programmer has had to make some compromises. Take the green ball for example: As there is only one shade of green it is a little difficult to spot on a green felt table. What you can do is to re-assign the colours before you run the program and the Chameleon will give you a more realistic view. It's not restricted to games either, as the subtle hues available for both foreground and background allow you to tailor the colours given by, say a word processor, to be restful to your eyes. Not everyone finds the same colours restful so you can personalise your system.

The simplest way of setting up a palette of colours from the Chameleon is to load it in from a file, but that has to be created first and that is where Listing I comes in. This will allow you to specify each colour and save the results to a disc file, as well as reloading files previously created. Before we look at the program in detail let's look at how we can specify a colour.

The easiest way to define one is to give it three numbers which specify the red, green and blue components that are sent to the colour guns in the monitor. This system matches what the hardware does. If a colour has these three components it can be thought of as a point in three dimensional cubic space. This is known as the colour cube and is shown in Figure I. The origin of the cube (bottom corner) represents black – no red, green or blue – and as you move out along one axis you increase just one of the colour components. When you have moved out to the maximum extent on all three axes you reach the corner opposite the origin which represents white.

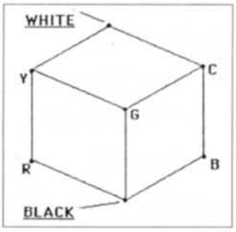

Figure I: The colour cube

A line drawn across the cube from black to white is known as the grey line and all grey shades lie along this line. The point of having a model of the colour definition like this is that it allows you to manipulate colours. For example, suppose you have two colours, these are two points inside the cube. Now if you want a range of colours that will blend from one to the other all you have to do is to draw a line between the original two and distribute the additional ones along this line. In that way you will always get a range of blending colours.

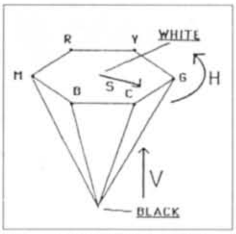

Figure II: The HVS model

While the colour cube model is quite good for some applications if you are trying to produce an exact match to a colour, it is not exactly intuitive as to which axis you need to move along. If we look at how an artist selects colours for painting we see a different approach. What he does is select a basic pigment or hue, and then add white to lighten it or reduce its saturation. If he wants a darker colour black paint is used to reduce the colour's brightness. This is why in any set of artist's paints the white tube is always the biggest – more of it gets used.

The HVS colour model tries to replicate this process by having three controls over the colour – H, the hue, V the value or brightness and S the saturation. In geometrical terms this can be thought of as a hexagonal cone as shown in Figure II. The H co-ordinate is around the cone, S is in to the centre and V is along the length. In hexcone space the line running up the centre of the cube is the grey one.

The program in Listing I will allow you to set

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‘You can use the Chameleon to change colours dynamically – the effect can be quite stunning’

➤

up any colour using either cubic or hexcone colour models. The program first sets up the palette to match the standard micro colours. As I mentioned last month, an alternate palette is stored in the Chameleon and this is initialised to a grey scale. To swap between the main and alternate palettes simply press E at any time.

To change any individual colour you must first type its number. The display then shows the working colour as the one you have selected. This can be altered by pressing R, G or B to add more of the primary colours into the working one. If Shift is held down at the same time the primary colour will be subtracted from the working one. The amount of any primary colour in a displayed colour is changed on a scale of 0 – none – to a maximum of 15.

In addition, you can specify the colour in HVS components: The following keys change more than one primary colour to give easier control over the exact shade:

S increases the saturation of a colour (how strong or pure the colour is)

Shift+S reduces the saturation of a colour

V increases the value or brightness of the colour

Shift+V reduces the value or brightness of the colour

H alters the the hue of the colour - gives a colour composed of the same proportions of the three primary colours but distributed among them differently.

It should be noted that,in the program, the colours are kept in RGB cubic coordinates and whenever the keys HVS are pressed, they are translated into HVS coordinates, altered and then converted back into RGB ones. This inevitably leads to some rounding errors, such that adding one unit of H and then subtracting one does not necessarily bring you back to the same colour.

Also if you get stuck on the grey line, S ceases to have meaning. When this happens S is moved towards the blue if requested to increase.

If you wish, you could write a program that keeps its value in HVS space, only converting when the hardware has to be accessed. The coordinate conversion procedures are easily culled and inserted into your own program.

If you want to have a range of blending colours, ones that harmonise with each other, the I key generates a whole range of colours that are interpolated between any two you choose.

You can view the results and then decide to keep them or revert to what you had before. This also allows you to select colours for shading an object to give the effect of light falling on it from various angles.

You can change the background colour by selecting colour 0 as the working one. Note that this affects the appearance of the other colours – a trick played by the eye and not by the Chameleon. As mentioned last month some monitors might object to this and produce some distortion.

Once you have set up a palette – and an alternative one if required – the values used can be saved on a file. W allows you to write a file of the colours – you can save as many as you want. A previously written file can be loaded using L and this can then be modified or used as it is.

When you have set up your palette, the initialisation program may be terminated by pressing Escape. Note that you will then be in Mode 2 graphics display. Alternatively, by pressing Control+Q you will have a cleared screen and be in Mode 7. Your own software can now be loaded or typed in. If you are typing it in be sure to type NEW to remove the initialisation program.

Remember that the Chameleon changes the display colours on the BBC Micro so the display colours as defined by the VDU 19 statement act in the same way as the logical colours did. Note also that you can use flashing colours with the Chameleon. As each colour can be precisely defined you are not restricted to flashing a colour and its complement – they can be any two colours that you have defined.

The program in Listing I uses a small machine code program to reprogram the Chameleon. This is to reduce the slight flickering on the screen that accompanies reprogramming. This is necessary as the initialisation software accesses the Chameleon many times in order to change the colour to exactly the one required. Note, it simply fires the numbers in the three registers to the user port – these are set up in the procedure DCOL and passed to the machine code in A%, X% and Y%.

The other major way of using the Chameleon is when you are writing your own programs. In these you can use it to change the colours dynamically. For example, in a graphic program of a sunset, as the sun goes down you can make the colours darken and the sun redden. Then you can have the moon rising and the colours turning more pale blue. The effect can be quite stunning.

Then you can use the Chameleon to produce palette switched animation where various frames are drawn in different colours, all of which except one is set to black. Then you simply have to reprogram the colours to get an animated effect.

You can also use the ability of the Chameleon to help you in graphic design, allowing you to select colours that match. For example, you could write a program to design needle work and alter the colours for the best effect. Another example of its use that has been tried is a package to teach the fundamentals of colour addition and filtering.

One of the most effective uses of a palette is when it comes to shading. You can give graphics a more 3D look by having darker shades towards the back of the object. There is not space here for examples of all these techniques, but I hope you have enough to, in best Body Build fashion, to allow you to explore the world of colour yourself.

● *Next month we will look at something to help the physically handicapped use a micro more easily, see you then.*

Listing I

```
   10 REM CHAMELION PALLETTE SETUP
   20 REM By Mike Cook
   30 REM Beeb Body Building Course Feb
90
   40 MODE 7
   50 DIM R(15),G(15),B(15),M% 18
   60 DIM RT(7),GT(7),BT(7)
   70 P%=&FE60
   80 ?&FE62=&FF
   90 ?&FE6C=&AE
  100 SCOL=M%
  110 P%=M%
  120 [
  130 OPT 0
  140 STA &FE60
  150 STX &FE60
  160 STY &FE60
  170 LDA #&E0
  180 STA &FE60
  190 RTS
  200 ]
  210 C=0
  220 FOR A=0 TO 7
  230 IF A AND 1 THEN R(A)=15 ELSE R(A)=
0
  240 IF A AND 2 THEN G(A)=15 ELSE G(A)=
0
  250 IF A AND 4 THEN B(A)=15 ELSE B(A)=
0
  260 PROCDCOL(A,R(A),G(A),B(A))
  270 PROCDCOL(A+8,C,C,C)
  280 R(A+8)=C:G(A+8)=C:B(A+8)=C
  290 C=C+2
  300 NEXT
  310 CLS
  320 PRINT"   CHAMELEON COLOUR PALETTE
SELECTOR"
  330 PRINT
  340 PRINT"Select a working colour by"
  350 PRINT"   typing its number."
  360 PRINT
  370 PRINT"Add more Red Green & Blue"
  380 PRINT"by hitting R G B Keys"
  390 PRINT"Hold down shift to subtract"
  400 PRINT
  410 PRINT"S - Will alter the saturatio
n"
  420 PRINT"V - Will alter the brightnes
s"
  430 PRINT"H - Will alter the hue"
  440 PRINT
  450 PRINT"E - To exchange main & alter
nate palettes"
  460 PRINT"I - Will interpolate between
 two colours"
  470 PRINT"L - To load a palette file"
  480 PRINT"W - To write a palette file"
  490 PRINT
  500 PRINT"CTRL Q - To Quit"
  510 PRINT
  520 PRINT"PRESS ANY KEY TO CONTINUE"
  530 N=GET
  540 MODE2
  550 PRINT TAB(0,15)
  560 FOR A=1 TO 7
  570 COLOUR A:GCOL 0,A
  580 PRINT "COLOUR NUMBER ";A
  590 PRINT
  600 MOVE 177*(A-1),1023
  610 PLOT 0,0,-200
  620 PLOT 81,177,0
  630 PLOT 0,0,200
  640 PLOT 81,-177,0
  650 NEXT
  660 PRINT TAB(0,7);" 1  2  3 4  5  6 7
"
  670 N=1
  680 PRINT TAB(0,10);"WORKING COLOUR No
.";N
  690 PRINT
  700 REPEAT
  710 PRINT"RED   =";R(N);" "
  720 PRINT"GREEN =";G(N);" "
  730 PRINT"BLUE  =";B(N);" "
  740 C$=GET$
  750 IF INKEY(-1) THEN INC=-1 ELSE INC=
1
  760 IF C$="R" THEN R(N)=R(N)+INC:IF R(
N)<0 OR R(N)>15 THEN R(N)=R(N)-INC
  770 IF C$="G" THEN G(N)=G(N)+INC:IF G(
N)<0 OR G(N)>15 THEN G(N)=G(N)-INC
  780 IF C$="B" THEN B(N)=B(N)+INC:IF B(
N)<0 OR B(N)>15 THEN B(N)=B(N)-INC
  790 IF C$="E" THEN PROCPSWAP
  800 IF C$="I" THEN PROCINTERP
  810 IF C$="H" THEN PROCHVAL(R(N),G(N),
B(N))
  820 IF C$="V" THEN PROCVVAL(R(N),G(N),
B(N))
  830 IF C$="S" THEN PROCSVAL(R(N),G(N),
B(N))
  840 IF C$="W" THEN PROCFILE(1)
  850 IF C$="L" THEN PROCFILE(0)
  860 IF C$=CHR$(17) THEN MODE 7:END
  870 PROCDCOL(N,R(N),G(N),B(N))
  880 PRINT TAB(0,12);
  890 UNTIL ASC(C$)<&3A
  900 N=ASC(C$) AND 7
  910  GOTO 680
  920 DEFPROCDCOL(CN%,R%,G%,B%)
  930 ?&FE60=&E0+CN%
  940 A%=R% EOR 15
  950 X%=(G% EOR 15)+64
  960 Y%=(B% EOR 15)+128
  970 *FX19
  980 CALL SCOL
  990 ENDPROC
 1000 DEF PROCPSWAP
 1010 LOCAL TEMP%
 1020 FOR A=0 TO 7
 1030 TEMP%=R(A):R(A)=R(A+8):R(A+8)=TEMP
%
 1040 TEMP%=G(A):G(A)=G(A+8):G(A+8)=TEMP
%
 1050 TEMP%=B(A):B(A)=B(A+8):B(A+8)=TEMP
%
 1060 NEXT
 1070 FOR A=0 TO 15
 1080 PROCDCOL(A,R(A),G(A),B(A))
 1090 NEXT
 1100 ENDPROC
 1110 DEF PROCINTERP
 1120 FOR A=0 TO 7
 1130 RT(A)=R(A)
 1140 GT(A)=G(A)
 1150 BT(A)=B(A)
 1160 NEXT
 1170 PRINT TAB(0,10);STRING$(120," ")
 1180 PRINT TAB(0,10);"INTERPOLATE BETWE
EN"
 1190 PRINT
 1200 PRINT "   COLOUR";
 1210 S%=GET AND 7
 1220 PRINT " ";S%
 1230 PRINT "TO COLOUR";
 1240 F%=GET AND 7
 1250 PRINT " ";F%
 1260 IF S%>F% THEN T%=S%:S%=F%:F%=T%
 1270 DIS%=F%-S%
 1280 IF DIS%<1 THEN 1460
 1290 RI=(R(F%)-R(S%))/DIS%
 1300 GI=(G(F%)-G(S%))/DIS%
 1310 BI=(B(F%)-B(S%))/DIS%
 1320 AGR=R(S%):AGG=G(S%):AGB=B(S%)
 1330 FOR A=S%+1 TO F%-1
 1340 AGR=AGR+RI
 1350 RT(A)=INT(AGR)
 1360 AGG=AGG+GI
 1370 GT(A)=INT(AGG)
 1380 AGB=AGB+BI
 1390 BT(A)=INT(AGB)
 1400 PROCDCOL(A,RT(A),GT(A),BT(A))
 1410 NEXT
 1420 PRINT"KEEP/REJECT (K/R)";
 1430 C$=GET$
 1440 IF C$="R" THEN 1490
 1450 IF C$="K" THEN 1460 ELSE 1430
 1460 FOR A=0 TO 7
 1470 R(A)=RT(A):G(A)=GT(A):B(A)=BT(A)
 1480 NEXT
 1490 FOR A=0 TO 7
 1500 PROCDCOL(A,R(A),G(A),B(A))
 1510 NEXT
 1520 PRINT TAB(0,10);STRING$(120," ")
 1530 C$=CHR$(N)
 1540 ENDPROC
 1550 DEF PROCHVAL(RI,GI,BI)
 1560 PROCRGB_HSV(RI,GI,BI)
 1570 H=H+INC*60
 1580 IF H<0 THEN H=0
 1590 IF H>430 THEN H=180:S=1/15
 1600 IF H>360 THEN H=H-360
 1610 PROCHVS_RGB
 1620 IF CERR=0 THEN R(N)=RI:G(N)=GI:B(N
)=BI
 1630 ENDPROC
 1640 DEF PROCVVAL(RI,GI,BI)
 1650 PROCRGB_HSV(RI,GI,BI)
 1660 V=V+(INC/15)
 1670 IF V>1 THEN V=1
 1680 IF V<0 THEN V=0
 1690 PROCHVS_RGB
 1700 IF CERR=0 THEN R(N)=RI:G(N)=GI:B(N
)=BI
 1710 ENDPROC
 1720 DEF PROCSVAL(RI,GI,BI)
 1730 PROCRGB_HSV(RI,GI,BI)
 1740 S=S+(INC/15)
 1750 IF S>1 THEN S=1
 1760 IF S<0 THEN S=0
 1770 IF S<>0 AND H>400 THEN H=180
 1780 PROCHVS_RGB
 1790 IF CERR=0 THEN R(N)=RI:G(N)=GI:B(N
)=BI
 1800 ENDPROC
 1810 DEF PROCRGB_HSV(RI,GI,BI)
 1820 RI=RI/15:GI=GI/15:BI=BI/15
 1830 MAX=RI
 1840 IF RI<GI THEN MAX=GI
 1850 IF MAX<BI THEN MAX=BI
 1860 MIN=RI
 1870 IF MIN>GI THEN MIN=GI
 1880 IF MIN>BI THEN MIN=BI
 1890 IF MAX=0 THEN S=0:V=0:GOTO 1930
```

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```
 1900 V=MAX
 1910 S=(MAX-MIN)/MAX
 1920 IF MAX=MIN THEN S=0
 1930 IF S=0 THEN H=999:GOTO 2020
 1940 RC=(MAX-RI)/(MAX-MIN)
 1950 GC=(MAX-GI)/(MAX-MIN)
 1960 BC=(MAX-BI)/(MAX-MIN)
 1970 IF RI=MAX THEN H=BC-GC
 1980 IF GI=MAX THEN H=2+RC-BC
 1990 IF BI=MAX THEN H=4+GC-RC
 2000 H=H*60
 2010 IF H<0 THEN H=H+360
 2020 ENDPROC
 2030 DEFPROCHVS_RGB
 2040  LOCAL I,F,P,Q
 2050 CERR=0
 2060 IF H>400 THEN RI=V:GI=V:BI=V:GOTO2
210
 2070 IF S=0 AND H<361 THEN CERR=1:ENDPR
OC
 2080 IF H=360 THEN H=0
 2090 H=H/60
 2100 I=INT(H)
 2110 F=H-I
 2120 P=V*(1-S)
 2130 Q=V*(1-(S*F))
 2140 T=V*(1-(S*(1-F)))
 2150 IF I=0 THEN RI=V:GI=T:BI=P
 2160 IF I=1 THEN RI=Q:GI=V:BI=P
 2170 IF I=2 THEN RI=P:GI=V:BI=T
 2180 IF I=3 THEN RI=P:GI=Q:BI=V
 2190 IF I=4 THEN RI=T:GI=P:BI=V
 2200 IF I=5 THEN RI=V:GI=P:BI=Q
 2210 RI=INT(RI*15+.5):GI=INT(GI*15+.5):
BI=INT(BI*15+.5)
 2220 ENDPROC
 2230 DEF PROCFILE(D%)
 2240 PRINT TAB(0,10);STRING$(120," ")
 2250 PRINT TAB(0,10);"FILE NAME";
 2260 IF D%=0 THEN PRINT" TO READ" ELSE
PRINT " TO WRITE"
 2270 PRINT "TYPE Q TO QUIT"
 2280 INPUT C$
 2290 IF C$="Q" THEN 2360
 2300 IF D%=0 THEN P%=OPENIN C$ ELSE P%=
OPENOUT C$
 2310 FOR A=0 TO 15
 2320 IF D%=0 THEN INPUT#P%,R(A),G(A),B(
A) ELSE PRINT#P%,R(A),G(A),B(A)
 2330 IF D%=0 THEN PROCDCOL(A,R(A),G(A),
B(A))
 2340 NEXT
 2350 CLOSE#P%
 2360  C$=CHR$(N+&30)
 2370 PRINT TAB(0,10);STRING$(120," ")
 2380 ENDPROC
```

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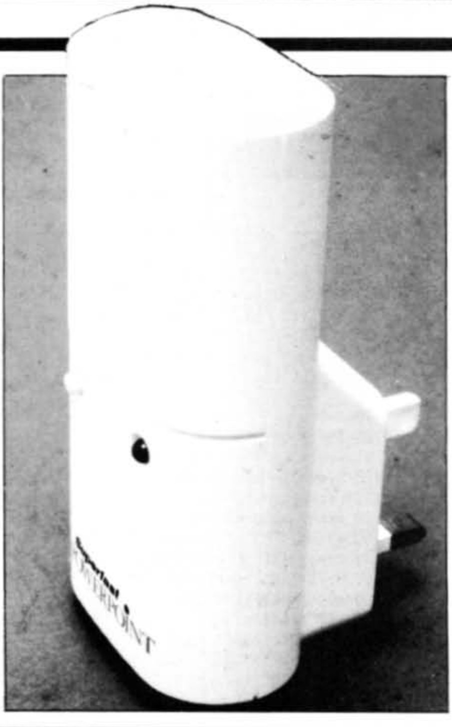

Checking up Checksums

Steve Turnbull unravels their innermost secrets

IT'S amazing how even copying one character differently from a listing in *The Micro User* can make the program fail. So to help you ensure that you have entered programs exactly as we printed them, with each there is a list of checksums called Get it Right!

The idea is simple: Enter the listing, call the checksum generator, check the numbers displayed against the ones printed in the magazine and, if they don't match, correct your listing and check it again.

The listings given with this article produces short machine code programs that generate checksums. Listing I is for the 8 bit BBC Micro and can stay resident in your micro to be called when you need it. Listing II – written by Paul Dellar – is for the Archimedes series and can be called from disc whenever it's required.

So type in the appropriate listing, taking care not to make any typing errors – unfortunately you haven't got Get it Right! yet. Save the routine and run it and the code created and saved is the new checksum generating program.

The 8 bit version is run from disc just by typing:

```
*xs
```

After this you can call it again with:

```
CALL&B00
```

No disc access is needed. Tape users should load it using:

```
*LOAD xs B00
```

It is then run by entering:

```
CALL &B00
```

On the Archimedes series, the saved code is loaded and run by typing:

```
*CHECK
```

To produce a printout of the checksums, enter Control+B before pressing the Return after *xs, *CHECK or the CALL. If you want the automatic paging facility use Control+N and to switch these off afterwards use Control+C and Control+O respectively.

If you are using the 6502 second or co-processor you should alter the program to run at &F600, by changing line 100 to read:

```
100 byte=&FFF4:code=&F600
```

It is used in just the same way. To call it after the first run use:

```
CALL&F600
```

So now you should be able to enter the listings published in *The Micro User* and be certain that you've typed them exactly as we've printed them.

Tape users

Save the program xs as described then to use it:

```
*Load xs B00
CALL &B00
```

All other instructions are the same as for disc users.

```
   10 REM Basic Checksum
   20 REM by Steve Turnbull
   30 REM (c) The Micro User
   40 MODE7:PROCinit
   50 PROCdeclare:PROCassemble
   60 PROCcli("SAVE xs "+STR$~code+"+200
")
   70 END
   80 DEF PROCinit
   90 newl=&FFE7:wrch=&FFEE
  100 byte=&FFF4:code=&B00
  110 rem=&F4:data=&DC
  120 return=&0D:spc=32
  130 qts=ASC"""":colon=ASC":"
  140 comma=ASC",":Lbrk=ASC"["
  150 rbrk=ASC"]":mcom=ASC"\"
  160 escflg=&FF:ENDPROC
  170 DEF PROCdeclare
  180 P%=&60:L%=2:[OPT L%
  190 .Lcrc OPT FNw:.ocrc OPT FNw
  200 .wcrc OPT FNw:.Lptr OPT FNw
  210 .Lnum OPT FNw:.LLen OPT FNb
  220 .Ltmp OPT FNb:.zflg OPT FNb
  230 .Lend OPT FNb:.qflg OPT FNb
  240 .LoNum OPT FNb:.HiNum OPT FNb
  250 .LoWork OPT FNb:.HiWrk OPT FNb
  260 .txtptr OPT FNw:.NmBase OPT FNb
  270 .crcptr OPT FNw:.codeflg OPT FNb
  280 .dataflg OPT FNb:.savebyt OPT FNb
  290 .FldSize OPT FNb:]:ENDPROC
  300 DEF FNb:P%=P%+1:=L%
  310 DEF FNw:P%=P%+2:=L%
  320 DEF PROCassemble
  330 FOR L%=0 TO 2 STEP 2
  340 P%=code:[OPT L%
  350 .check:LDA #0:STA codeflg
  360  STA ocrc:STA ocrc+1
  370  LDA #131:JSR byte
  380  STX Lptr:STY Lptr+1
  390 .start:JSR newl
  400 .while:BIT escflg:BMI escape
  410  LDY #1:LDA (Lptr),Y:BPL doline
  420 .wayout:RTS
  430 .escape:BRK:BRK
  440  EQUS "Escape":BRK
  450 .bad:BRK:BRK
  460  EQUS "Bad program":BRK
  470 .doline:LDA #0:STA Lcrc:STA Lcrc+1
  480  STA qflg:STA dataflg
  490  TAY:LDA (Lptr),Y:CMP #&0D:BNE bad
  500  INY:LDA (Lptr),Y:STA Lnum+1
  510  INY:LDA (Lptr),Y:STA Lnum
  520  INY:LDA (Lptr),Y:STA Lend
  530  JSR prescan:CPY #5
  540  BCC display:LDY #4
  550 .skipspc:LDA (Lptr),Y
  560  CMP #spc:BNE scan:INY:CPY LLen
  570  BEQ display:BNE skipspc
  580 .scan:LDA (Lptr),Y:JSR dobyte
  590  INY:CPY LLen:BCC scan
  600 .display:LDX Lnum:LDY Lnum+1
  610  JSR pdec:LDA #spc:JSR wrch
  620  LDA #ASC"=":JSR wrch:LDA #spc
  630  JSR wrch:LDX Lcrc:LDY Lcrc+1
  640  JSR phex:LDA ocrc:JSR lastchk
  650  LDY LLen:CPY Lend:BEQ newline
```

on your

Get it right!

Step–by–step guide to using checksums

Let's assume you've decided to type in a game from *The Micro User.* You've switched on your micro and the appropriate magazine is open beside it:

- Type in about 10 lines of the program. Note that for clarity we use LISTO 1 to display spaces between the line number and the actual line. You should not enter these as they waste memory.
- Next run whichever version of the checksum program you are using to produce the checksums for these first lines.
- A checksum consists of up to four hexadecimal digits in a group followed by a space and then a single digit called the cumulative digit.
- Compare the cumulative digit of the last line displayed with the equivalent digit in the checksum list in the magazine.
- If they are the same you know that you have made no errors so far, and you can safely type in the next few lines and repeat the check for these.
- When there is a difference in the cumulative digits, find the first one which differs. Either that line or the one before will contain a discrepancy between the magazine and what you have typed – the odd line out can be identified because the group of four digits listed by the program will be different to those in the magazine.

Common errors to watch out for are: Confusions between a lower case L and the digit one, digit zero and capital O, or incorrect numbers of spaces between quotes and so on.

- Once you have found and corrected the difference you should do the checksums for that group of lines again so you can spot any other differences.
- Just keep repeating the enter, checksum and correction sequence until you've typed in the whole program, which will then run correctly first time.

Once you have become familiar and confident with the technique you can type in bigger chunks of the program before checking. In time you will be able to type in the whole program before using the checksums – but the checking method remains the same.

In the stars

Sometimes you will find an asterisk at the end of a checksum. This means that you've added one or more unnecessary spaces to the end of the line.

The space between the line number and the actual line doesn't affect the checksum, but it should be omitted to conserve memory.

```
660  LDA #ASC"*":JSR wrch
670 .newline:JSR newl
680 .update:CLC:LDA Lptr:ADC Lend
690  STA Lptr:BCC unwhile:INC Lptr+1
700 .unwhile:JMP while
710 .prescan:LDY Lend
720 .psLoop:DEY:LDA (Lptr),Y
730  CMP #spc:BEQ psLoop:INY
740  STY LLen:RTS
750 .dobyte:STA savebyt:CMP #qts
760  BNE notqe:PHA:LDA qflg
770  EOR #&FF:STA qflg:PLA
780 .notqe:BIT qflg:BMI skpcode
790  BIT codeflg:BMI jcode
800  JSR basic:JMP skpcode
810 .jcode:JSR mcode
820 .skpcode:LDA savebyt:CPY LLen
830  BEQ skipcrc:STY Ltmp:LDX Lcrc
840  LDY Lcrc+1:JSR docrc:STX Lcrc
850  STY Lcrc+1:LDX ocrc:LDY ocrc+1
860  JSR docrc:STX ocrc:STY ocrc+1
870  LDY Ltmp
```

```
  880 .skipcrc:RTS
  890 .basic:CMP #rem:BEQ skpline
  900  CMP #data:BNE skpdata:DEC
dataflg
  910 .skpdata:BIT dataflg:BMI xbasic
  920  CMP #Lbrk:BNE xbasic:LDA #&FF
```

All program listings in this issue are among the hundreds available for downloading FREE on

MicroLink

```
930  STA codeflg:RTS
940 .skpline:LDY LLen
950 .xbasic:RTS
960 .mcode:CMP #mcom:BEQ skipcom
970  CMP #rbrk:BNE xmcode
980  LDA #0:STA codeflg
990 .xmcode:RTS
```

```
1000 .skipcom:LDA qflg:PHA
1010  LDA #0:STA qflg
1020 .skpLoop:INY:LDA (Lptr),Y
1030  CMP #qts:BNE skpchk:PHA
1040  LDA qflg:EOR #&FF:STA qflg:PLA
1050 .skpchk:CPY LLen:BEQ skpexit
1060  CMP #colon:BNE skpLoop:BIT qflg
1070  BMI skpLoop
1080 .skpexit:PLA:STA qflg
1090  LDA (Lptr),Y:STA savebyt:RTS
1100 .docrc:PHA:STX wcrc:STY wcrc+1
1110  EOR wcrc+1:STA wcrc+1:LDX #7
1120 .crclp:BIT wcrc+1:CLC:BPL crcskp
1130  LDA wcrc:EOR #&10:STA wcrc
1140  LDA wcrc+1:EOR #&08:STA wcrc+1
1150  SEC
1160 .crcskp:ROL wcrc:ROL wcrc+1:DEX
1170  BPL crclp:LDX wcrc:LDY wcrc+1
1180  PLA:RTS
1190 .lastchk:PHA:LDA #spc:JSR wrch
1200  PLA:AND #&0F:TAX:LDA #&FF
```

Turn to Page 106 ▶

Listing I: The 8 bit version

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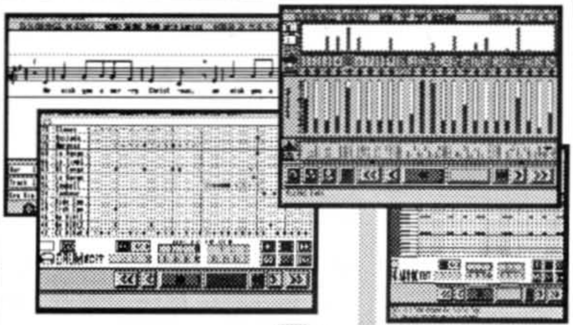

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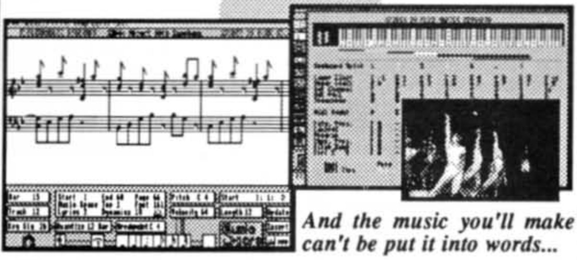

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THE HEART OF THE ARPEGGIO MUSIC SYSTEM...

Getting out of the error trap

Martin Goose shows how to debug Forth the easy way

MANY newcomers to Forth find the lack of error checking – and the consequent help that this could give during program development – a problem. So, here we present two aids to debugging Forth source code and they will prove invaluable when developing non-trivial programs.

Forth is a compiled language and the source code is kept in blocks, normally 1,024 bytes each – a handy screen-sized unit. New Forth words are defined in the source code and are then compiled into the dictionary which resides in memory. The entry for each word consists of a header, the word's label and a body – which usually defines the word's action.

Unlike an English dictionary, the words appear in the order in which they have been defined, and each successive one is set up using the previously defined ones. This repeatedly gives more complex actions until the complete program is defined as the action of the last word, and this can then be executed.

Two types of error can occur during programming: One in the source code which leads to a compilation error, or one in program logic which does not inhibit compilation but gives the wrong run-time behaviour. The first type is reported by Acornsoft Forth with the output of a question mark and the offending word followed by a marginally helpful error message – the exact wording depending on whether the tape, disc or rom version is in use.

When compiling perhaps 20 to 50 blocks from disc or tape it would be helpful to have an indication of which was compiling when the error occurred so that tedious searching is avoided. If both the current block and the position within it when the error occurred can be determined, it is possible to go straight to the error.

The second type may be encountered in many ways. At worst it can cause the machine to crash, but it could just make it take the wrong action. You may have an idea which of the words that you have defined is not behaving as it should, but the question is in which block was it defined?

With Basic many run-time errors are detected and execution stops with a message which reports the defective line. Forth rarely does this and gains much of its speed by minimising such run-time checking, but no language can trap an error in program logic, and here you are on your own.

It is possible to modify the dictionary entry for each word to include details of the block number from which it was compiled and the position within it. This information can later be retrieved and used to refer straight back to the source code which generated the dictionary entry.

Compile time errors

Program compilation in Forth is achieved by LOADing a series of blocks which contain an application's source code. New words can also be defined from the keyboard, but this is only practical for simple ones. Some of the source code may lead to actions taken at compile-time and some may switch the compiler on and off – for example by using the Forth words : and ; .

This puts new entries in the dictionary, and in both cases the action being taken during LOADing is to break down the contents of the block into words separated by one or more spaces. An error is reported if the separated word is not recognised.

During the process of LOADing the contents of blocks the Forth variable *BLK* contains the current block number and the variable *>IN* contains the offset – in the range 0 to 1023 – into the block. If input is being taken from the keyboard *BLK* contains 0.

When an error occurs the current values of *BLK* and *>IN* can be kept for later use by introducing extra actions into Forth's error-handling routines. The trick is to wedge the necessary extra actions into place.

Fortunately, in Acornsoft Forth some of the most important routines are accessed via vectors which point to the actual code to be executed – similar to the vectoring of MOS calls such as *oswrch*. Error handling in Acornsoft Forth includes the vectored routine MESSAGE. Its default action is to execute $MSG in rom-based systems or MSG# in tape or disc based systems.

The routine (EEDIT) carries out the necessary action to copy *BLK* and *>IN* and also executes $MSG. Copying the value of *BLK* to its error counterpart *EBLK* is trivial. If the value of *>IN* is copied direct to its counterpart *E>IN* it would point to the space after the word causing the error, as Forth cannot know that the word will cause an error until it has scanned past it. It is easy to make the necessary adjustment, because as each word is found it is transferred to the word buffer at *WBFR* and stored there with an initial length byte.

It is from the word buffer that the error-handling routines report the offending word back to you. So (EEDIT) has to adjust the value of *E>IN* to compensate for the length of the word. The action of MESSAGE is then reASSIGNed to do (EEDIT). Don't forget to replace $MSG by MSG# in the definition of (EEDIT) if you are using a disc or tape system.

Once the error has been reported and control returns to the keyboard it is simply a matter of typing EEDIT – a word which retrieves the error values and acts upon them. EEDIT can be

➤

The routines

These two routines are useful aids to debugging Forth programs as they present useful information about where any errors lie.

- **EEDIT**
  If a compile-time error occurs EEDIT can be used to report the block number and the line within it. It also displays the offending line.
- **SHOW**
  Finding the particular Forth routine or word causing a run-time error can be tricky. SHOW is designed to make this task much easier.

➤

modified to suit any editor and the version given here reports the error block number and line number within it. It also displays the offending line.

Run-time errors

Run-time errors are often traceable directly to a particular routine or Forth word. In other cases it is necessary to examine the program structure, usually from the top down, until the mistake in the logic is found. In both cases the need is to be able to go swiftly to the block in which a particular Forth word was defined. One way to do this is to store the current values of *BLK* and *>IN* with each new Forth word as it compiles using a similar technique to trapping the compile-time errors.

When a new Forth word is defined its header is created by the word CREATE which is used by all Forth words which create a header – CONSTANT, VARIABLE and : are examples. CREATE is also vectored so it can be intercepted and modified. Its default action is (CREATE).

A simple strategy is to store in the dictionary the current values of *BLK* and *>IN* immediately before the standard header is CREATEd. This is the purpose of NEWCREATE. The coding is very simple, as in this case the value of *>IN* does not have to be adjusted.

Recovering the source code is accomplished by the new word SHOW. Its coding is more complicated as it has to deal with four cases:

- Words defined before NEWCREATE in the dictionary. These do not have the modified header and cannot be SHOWn.
- Words defined from the keyboard where there is no source code to SHOW.
- Words that have not been defined. These are usually simple cases of incorrect spelling.
- Words LOADed from blocks which can be SHOWn.

In order to help distinguish the four cases a MARKER is placed in the dictionary to separate the first and final case. The second is trapped because *BLK* is zero when input is being taken from the keyboard. The third Case is trapped because FIND doesn't.

One final touch is to modify FORGET so that it FORGETs the extra four bytes. FENCE is also reset so as not to allow FORGETing of words newly ASSIGNed or words without the extra four bytes in the header.

Go Forth and adapt

These two tips to help you debug Forth code have been kept simple to make them usable on most systems. They should be compiled into the dictionary before any words in your Forth application are LOADed. Both EEDIT and SHOW update the value of SCR so that the whole block is ready for editing and can be displayed with the EDITOR word L.

With a full screen editor and a Mode 3 display both EEDIT and SHOW can be made to display the complete block with the cursor correctly positioned. The versions given need only be the start for you to adapt them to your needs.

```
( Toolkit                   EEDIT                1 of 2    )

VARIABLE EBLK                     ( will hold error value of BLK )

VARIABLE E>IN                     ( will hold error value of >IN )

: (EEDIT )    ( -- )                     ( new error routine to  )
        BLK @    EBLK !                 ( transfer values of BLK )
        >IN @  WBFR C@ - 1-    E>IN !    ( and >IN to their error)
        $MSG ;                                  ( counterparts )

ASSIGN  MESSAGE TO-DO  (EEDIT)        (  insert new error routine)
                                 ( into error processing procedures)
                                                               -->




( Toolkit                  EEDIT                  2 of 2    )

: EEDIT       ( -- )               ( display details of block and )
                                   ( line where error occured and )
                                   ( text of line                 )
          EBLK @   ?DUP
          IF    CR ." Error in block " DUP .  DUP SCR !
                E>IN @ 64 /  ." line " DUP .
                SWAP CR .LINE
          ELSE ." Last Error was from the Keyboard "
          THEN
          CR         ;

HERE FENCE !
```

EEDIT: The routine to locate compile-time errors

```
( Toolkit                    SHOW                 1 of 2      )

: NEWCREATE ( -- )                      ( new CREATE which saves     )
             BLK @ ,                    ( block and offset in header )
             >IN @ ,
             (CREATE) ;

ASSIGN CREATE TO-DO NEWCREATE

:  FORGET        FORGET -4 ALLOT ;         ( FORGET 4 extra bytes )

HERE CONSTANT MARKER  ( cannot SHOW dictionary entry before here)

HERE FENCE !      ( set FENCE to prevent inadvertent FORGETting )

                                                                -->

( Toolkit      SHOW                                2 of 2      )

: SHOW   FIND ?DUP               ( usage :- SHOW <word>  displays  )
         IF  DUP  MARKER <               ( where <word> was defined )
             IF ." Can't SHOW  "  2+ NFA ID.
             ELSE
                2+ NFA  DUP
                2- 2- @ ?DUP
                IF     CR ." Defined in block " DUP . DUP SCR !
                       SWAP 2- @ 64 / ." line " DUP .
                       SWAP CR .LINE
                ELSE  ID. ." was defined from the keyboard"
                THEN
             THEN
         ELSE ." Word not found "
         THEN   CR     ;
```

Run-time errors can be traced much more quickly using SHOW

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It takes all sorts...

Anton Mans climbs the recursive tree

RECURSIVE routines are immensely satisfying. You can accomplish a great deal with very little code, and the programs positively drip elegance and panache. But they are often difficult to grasp. The human mind is used to dealing with the big, parallel-processed picture and usually boggles just the tiniest bit at the apparently contorted complexities of recursion.

And the micro seems to bury itself deeper and deeper into an unimaginable tangle and then effortlessly unravels itself to surface with the answer – with not a bit out of place.

A number of sorting routines use recursion, quick-sorting being a prime example. But one method which has received little attention is the tree sort. In its simplest terms, the idea is that each subsequent item is compared against the first and is assigned a place in a logical tree.

If you are terrified of recursion, you need read no further. Just type in the listing, check you have made no typing errors using Get it Right! and use it. For those of you brave enough, let's take a look at how it works by taking the example of three words: DOG, CAT and RAT, supplied in that order.

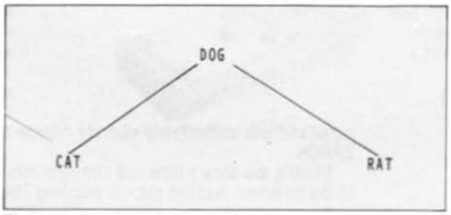

Figure I: Creating the sort tree

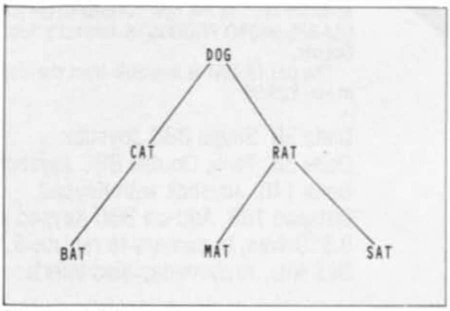

Figure II: A fuller sort tree

> *The best way to master recursion is to write a recursive program. Catch 22?*

DOG forms the root. CAT is compared to DOG and is found, alphabetically speaking, to be smaller. So it is assigned a position to the left of DOG. RAT is greater than DOG and is given a place to the right as shown in Figure I.

Add another three words to the list: MAT, SAT and BAT. MAT is compared to DOG and is greater, so follow the right hand path. Compare it to what you find there – in this case RAT – and it is smaller so it goes to the left. Compare SAT to DOG – it's greater, so go right. Compare SAT to RAT – it's also greater than that, go right again. Compare BAT to DOG – smaller, go left. BAT is also smaller than CAT, so go left again. The result is shown in Figure II.

Strictly speaking, Figures I and II are not quite correct – they do not explicitly state that there is no right hand branch to CAT, or that BAT, MAT and SAT are terminal branches. This could be shown as in Figure III, zero indicating a null or empty branch, called *nil*.

How are we going to implement this idea on a micro? We need an array to hold the items to be sorted plus an array of pointers. Suppose we had loaded the words into an array, so that word$(1)="DOG", word$(2)="CAT" and so on. Now we need another array, this time of pointers associated with the first to point to the next word. "Ha!" You say, "I knew there was a catch." Actually, it's called a trade-off. More about it later.

The pointer array has two dimensions. The first tells you which entry in word$() is to the left of – smaller than – the word you are looking at now. The second element specifies which is to the right of – is greater than – the current word. So, word$(1)="DOG", pointer%(1,1)=2 which is "CAT" and pointer%(1,2)=3 is "RAT". Where there are no further entries the value of the

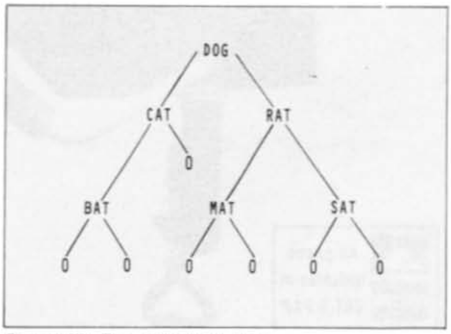

Figure III: The corrected sort tree showing empty branches

appropriate pointer%() element is zero. Setting up the complete arrays, we get Figure IV.

Believe it or not, the array word$() is now sorted. You probably noticed that it happened recursively. The odd thing is that the array has not been changed in the slightest. The words are all still in their original order in the array. Only the array of pointers has changed insofar as the elements have now been assigned values – but that is, after all, only for the micro's use when printing the sorted array.

This is where the trade-off comes in. What you win on the swings, you lose on the roundabout. You get a fast sort – only slightly slower than quick sort – and you still have your array in the original order. It's almost like having your cake and eating it, but you pay for it with the extra memory taken up.

So how do we represent the array as sorted? We print it, like this: Get the left pointer of word 1 – DOG. If it is not nil then there is a smaller word – CAT. Get that word's left pointer. If it is not nil, there is a smaller word – BAT. Get that word's left pointer: It's nil which means it's the smallest word of all so print it.

Now go back to the previous word – CAT. It must be the next smallest, so print it too. Has it got a right branch? No, so back up the tree one level to DOG and print that. As it happens DOG is at the top of the tree – top dog?

Now look at the right branch of DOG. It is not nil, which takes us to RAT. Does it have a left branch? Yes – MAT. Does this have a left branch? No, so print it. Does MAT have a right branch? No, so back up one level to RAT and print it. Now follow its right branch, which is SAT – which has no left branch to follow, so print it immediately. No right branch either so back up – we've done RAT so up another level. We're now at the top of the tree and we've finished.

You should now have an inkling of the recursiveness of the process. Each word is a node of the tree and all words to the left – no matter how far down – are smaller than that and all to the right are greater. Words immediately below a node are ordered to left or right with respect to that node.

In principle any node is identical to any other in the sense that it consists of an item with a greater above it, a lesser (or nil) to the left and to the right a greater (or nil) which is not greater to its parent node. Only in the case of the root node is there none above.

Tree sorting uses recursion twice – once when setting up the pointers and again when printing the list in sorted order. It also uses indirect recursion. Direct recursion occurs when a procedure or function calls itself. Indirect recursion occurs when procedure A calls procedure B, which in turn calls procedure A. It is not evident from the examination of each individual isolated procedure that it is, in fact, recursive.

Setting up the pointers uses a mixture of direct and indirect recursion, and printing uses direct recursion.

In the program given here most of the code is for prettying up the display. Only PROCsetuptree, PROCleft, PROCright and PROCprint–sorted are essential, provided you have some other source of unsorted words. This is provided here by PROCrandom–words and an Archimedes can sort 10,000 random words in 108 seconds.

n	word$(n)	pointer%(n,1)	pointer%(n,2)
1	DOG	2	3
2	CAT	6	0
3	RAT	4	5
4	MAT	0	0
5	SAT	0	0
6	BAT	0	0

Figure IV: The Basic array arrangement

If you've had problems understanding that, probably the easiest way is to trace the output of a program – do it in a quiet room! In fact the best way to master recursion is to write a recursive program. Catch 22?

```
   10 REM > TreeSort
   20 REM   by Anton L. Mans
   30 REM   (c) The Micro User
   40 number_of_words%=10
   50 left%=0:right%=1:DIM word$(number_
of_words%),pointer%(number_of_words%,1)
   60 MODE 0
   70 PROCrandom_words
   80 TIME=0
   90 PROCsetup_tree
  100 T%=TIME
  110 PROCprint_unsorted
  120 VDU 28,40,31,79,0
  130 PRINT ''SPC9;"SORTED LIST"'SPC9;ST
RING$(11,"-")
  140 PROCprint_sorted(1)
  150 VDU26
  160 PRINT TAB(20,30)"Time to sort ";nu
mber_of_words%;" words: ";T%/100;" secon
ds.";
  170 VDU 26
  180 END
  190 DEF PROCsetup_tree LOCAL I%
  200 CLS
  210 PRINT TAB(36,10);"Sorting."
  220 FOR I%=2 TO number_of_words%
  230 IF word$(I%)<=word$(1) THEN PROCle
ft(1) ELSE PROCright(1)
  240 NEXT
  250 ENDPROC
  260 DEF PROCleft(node%)
  270 IF pointer%(node%,left%)=0 THEN po
inter%(node%,left%)=I%:ENDPROC
  280 IF word$(pointer%(node%,left%))>=w
ord$(I%) THEN PROCleft(pointer%(node%,le
ft%)) ELSE PROCright(pointer%(node%,left
%))
  290 ENDPROC
  300 DEF PROCright(node%)
  310 IF pointer%(node%,right%)=0 THEN p
ointer%(node%,right%)=I%:ENDPROC
  320 IF word$(pointer%(node%,right%))>=
word$(I%) THEN PROCleft(pointer%(node%,r
ight%)) ELSE PROCright(pointer%(node%,ri
ght%))
  330 ENDPROC
  340 DEF PROCprint_sorted(I%):IF I%=0 T
HEN ENDPROC
  350 LOCAL @%:@%=&902
  360 PROCprint_sorted(pointer%(I%,left%
))
  370 PRINT SPC6;word$(I%);TAB(18);" (",
I%;")"
  380 PROCprint_sorted(pointer%(I%,right
%))
  390 ENDPROC
  400 DEF PROCprint_unsorted LOCAL @%,I%
  410 @%=&905
  420 CLS
  430 PRINT'SPC7;"WORD";SPC(12);"POINTER
S"
  440 PRINT SPC22;"left right"
  450 PRINT SPC3;STRING$(28,"-")
  460 FOR I%=1 TO number_of_words%
  470 PRINT,I%,TAB(6)word$(I%),TAB(20),p
ointer%(I%,0),pointer%(I%,1)
  480 NEXT
  490 ENDPROC
  500 DEF PROCrandom_words LOCAL I%,J%
  510 PRINT TAB(20,10);"Setting up array
 of random words."
  520 FOR I%=1 TO number_of_words%
  530 word$(I%)="1234567890"
  540 word$(I%)=""
  550 FOR J%=1 TO RND(5)+5
  560 word$(I%)=word$(I%)+CHR$(64+RND(26
))
  570 NEXT
  580 pointer%(I%,0)=0
  590 pointer%(I%,1)=0
  600 NEXT
  610 ENDPROC
  620 NEXT
  630 ENDPROC
```

Get it right!

```
 10 =    0 0 | 220 = 6BF0 F | 430 = 6E58 8
 20 =    0 0 | 230 =  768 F | 440 = A058 A
 30 =    0 0 | 240 = 2C83 F | 450 = B792 8
 40 = B9D8 8 | 250 = ED0F B | 460 = 3525 A
 50 = 396D 2 | 260 = AAE2 2 | 470 = 7591 0
 60 = 6075 A | 270 = 529E 7 | 480 = 2C83 B
 70 = 8C1E 1 | 280 = 3FB6 8 | 490 = ED0F F
 80 = 173E B | 290 = ED0F D | 500 = EADF 9
 90 = F2EC 1 | 300 = 3F7E B | 510 = 70EC 2
100 = 32AD 4 | 310 = 2068 4 | 520 = 3525 4
110 = 766F 6 | 320 = 9848 3 | 530 = A9CC F
120 = 2E04 8 | 330 = ED0F 0 | 540 = 2B80 5
130 = 6385 2 | 340 = FBF8 A | 550 = 57F8 2
140 = 6E99 A | 350 =  5E5 A | 560 = 8D66 1
150 = B962 E | 360 = E685 5 | 570 = 2C83 9
160 = F015 6 | 370 = 4AC1 B | 580 = FCD4 B
170 = E3A0 2 | 380 = E052 6 | 590 = 8A60 B
180 = FD2E 6 | 390 = ED0F 1 | 600 = 2C83 3
190 = 3229 C | 400 = 625B C | 610 = ED0F F
200 = 7A16 1 | 410 = AEF1 8 | 620 = 2C83 8
210 = 46CA 9 | 420 = 7A16 C | 630 = ED0F C
```

Inter-Word converter

John Allen presents more file interchange routines

LAST month we described a routine which took a file containing a View wordprocessor document file and converted it into a form which could be loaded and used by Inter-Word, Wordwise, Wordwise Plus or Mini Office II.

Unfortunately the listing printed then was the one for this month and converts files created in InterWord to the form required by one of the other four. So here we'll give the missing listing to convert View files to the others and explain the features of last month's listing.

To convert files, simply type in the listings and check you haven't made any typing errors using Get it Right! Save them and when you run them it's just a matter of following the on-screen prompts to convert your files to the appropriate format.

When you transfer files from Inter-Word the first items placed into the new file are the sizes of the margins and the line spacing – any that differ from the defaults are specified. The sizes of the margins are adjusted to take the line spacing into account so that if, say, the Inter-Word text is double spaced the resulting margins at the top and bottom will be the corresponding Inter-Word ones multiplied by 2, giving the same number of lines on the paper.

The panels opposite give details of features from within the original text that are transferred from the Inter-Word file to the new one. So, using either this month's or last month's routine you can convert View or Inter-Word files to a form suitable for the other popular BBC Micro word processors. Next month, the set is completed with a program to convert Wordwise, Wordwise Plus or Mini Office II files to a format that can be used directly by Inter-Word or View.

```
   10 REM View to Inter-Word, Wordwise a
nd Mini Office II converter
   20 REM by John Allen
   30 REM(c)The Micro User
   40 DIM trule%(50)
   50 title$=CHR$(132)+CHR$(157)+CHR$(13
1)+CHR$(141)+"          VIEW Converter"
   60 MODE7:PRINT 'title$;'title$''
   70 pad$=CHR$(131)+"      "
   80 PRINT pad$;"1) to InterWord"
   90 PRINT pad$;"2) to Wordwise"
  100 PRINT pad$;"3) to Wordwise Plus"
  110 PRINT pad$;"4) to Mini Office II"
  120 PRINT '" Enter choice";CHR$(134);
  130 REPEAT:option$=GET$:UNTIL INSTR("1
234",option$)
  140 PRINT option$
  150 IF option$="4" THEN term%=3:just$=
"FJ":nojust$="RR":C$="C":tab%=9 ELSE ter
m%=7:just$="JO":nojust$="NJ":C$="O":tab%
=&DD
  160 PRINT ''CHR$(131);"          View fi
le name:";CHR$(134);
  170 INPUT ""source$
  180 H%=OPENIN(source$)
  190 IF H%=0 THEN CLOSE#0:PRINT 'CHR$(1
36);CHR$(129);"View file does not exist,
 try again":GOTO 160
  200 PRINT 'CHR$(131);"Name of file to
create:";CHR$(134);
  210 INPUT ""dest$
  220 D%=OPENOUT(dest$)
  230 oldJ%=0:cr%=1:pb%=16:pl%=66:tm%=4:
hm%=4:fm%=4:bm%=4:lm%=0:rm%=74:ls%=0:nru
le%=0
  240 REPEAT
  250 B%=BGET#H%:IF B%=&80 THEN PROCembe
d
  260 UNTIL EOF#H%
  270 IF option$="1" THEN PROCiwhead ELS
E PROCwwhead
  280 PTR#H%=0
  290 ON ERROR GOTO 670
  300 REPEAT
  310 J%=0:uline%=0:hbold%=0:cent%=0:rig
ht%=0:left%=0
  320 ptr%=PTR#H%:length%=0
  330 REPEAT
  340 B%=BGET#H%
  350 length%=length%+1
  360 IF B%=&1A THEN J%=1
  370 UNTIL B%=13
  380 IF length%>1 AND J%=0 AND length%+
18<rm% THEN left%=1
  390 PTR#H%=ptr%:ps%=PTR#D%
  400 IF option$<>"1" THEN PROCwwtext:GO
TO 640
  410 IF J%=oldJ% THEN GOTO 430
  420 IF J%=0 THEN BPUT#D%,25:ps%=PTR#D%
 ELSE BPUT#D%,&92
  430 B%=BGET#H%
  440 IF B%=&81 THEN PROCruler:GOTO 430
  450 IF B%=&80 THEN PROCembedtext:GOTO
430
  460 IF B%<>13 THEN cr%=0 ELSE PROCisfi
rst(13):GOTO 310
  470 IF B%>31 THEN PROCisfirst(B%):GOTO
 520
  480 IF B%=&1C THEN PROCisfirst(FNul):G
OTO 520
  490 IF B%=&1D THEN PROCisfirst(FNbold)
:GOTO 520
  500 IF B%=&B THEN GOTO 430
  510 IF B%=9 THEN PROCisfirst(9)
  520 B%=BGET#H%
  530 IF B%>31 THEN BPUT#D%,B%:GOTO 520
  540 IF B%=&1C THEN BPUT#D%,FNul:GOTO 5
20
  550 IF B%=&1D THEN BPUT#D%,FNbold:GOTO
 520
  560 IF B%=&1A THEN GOTO 520
  570 IF B%=9 THEN BPUT#D%,9:GOTO 520
  580 IF hbold%=1 THEN BPUT#D%,19
  590 IF uline%=1 THEN BPUT#D%,20
  600 IF cent%=1 THEN BPUT#D%,23
  610 IF right%=1 THEN BPUT#D%,24:BPUT#D
%,13:cr%=1
  620 IF left%=1 THEN BPUT#D%,13:cr%=1
  630 IF left%=0 AND cent%=0 AND right%=
0 THEN BPUT#D%,32
  640 oldJ%=J%
  650 UNTIL FALSE
  660 :
  670 IF option$<>"1" THEN GOTO 730
  680 BPUT#D%,&81:BPUT#D%,1:BPUT#D%,&87:
BPUT#D%,255:BPUT#D%,255
  690 PTR#D%=PTR#D%-1
  700 lb%=PTR#D% MOD 256:hb%=PTR#D% DIV
256
  710 PTR#D%=&34
  720 BPUT#D%,lb%:BPUT#D%,hb%
  730 CLOSE#0
  740 END
  750 :
  760 DEFFNbold
  770 hbold%=(hbold%+1) MOD 2
  780 IF hbold%=1 THEN =11 ELSE =19
  790 :
  800 DEFFNul
  810 uline%=(uline%+1) MOD 2
  820 IF uline%=1 THEN =12 ELSE =20
  830 :
  840 DEF PROCisfirst(no%)
  850 IFno%=13 AND cr%=0 THEN BPUT#D%,no
%:BPUT#D%,&8D:cr%=1:ENDPROC
  860 IF ps%=PTR#D% THEN BPUT#D%,(no%+12
8) ELSE BPUT#D%,no%
  870 ENDPROC
  880 :
  890 DEFPROCembed
  900 PROCpar
  910 IF code$<>"PB" THEN GOTO 940
  920 IF par$="0" OR par$="OFF" pb%=0 EL
SE pb%=16
  930 ENDPROC
  940 IF option$<>"1" THEN ENDPROC
  950 IF code$="PL" AND pl%<256 THEN pl%
=256+VAL(par$):ENDPROC
  960 IF code$="TM" AND tm%<256 THEN tm%
=256+VAL(par$):ENDPROC
  970 IF code$="HM" AND hm%<256 THEN hm%
=256+VAL(par$):ENDPROC
  980 IF code$="FM" AND fm%<256 THEN hm%
=256+VAL(par$):ENDPROC
  990 IF code$="BM" AND bm%<256 THEN bm%
=256+VAL(par$):ENDPROC
 1000 IF code$="LM" AND lm%<256 THEN lm%
=256+VAL(par$):ENDPROC
 1010 IF code$="LS" AND ls%<256 THEN ls%
=256+VAL(par$)
 1020 ENDPROC
 1030 :
 1040 DEFPROCruler
 1050 A%=BGET#H%:A%=BGET#H%
 1060 tno%=0:rm%=250
 1070 FOR I%=0 TO 250
 1080 B%=BGET#H%
```

Features of Inter-Word that are translated to View

- **Rulers:** These are defined as an LM edit command for the left margin of the Inter-Word ruler followed by the View ruler with no indentation, but retaining the tab points. Any indent for the start of paragraphs contained within the Inter-Word ruler is ignored in the translation since that feature is not supported in the same way by View.
- **Centred text:** Translated exactly.
- **Right aligned text:** Translated exactly.
- **Underlining:** Translated to highlight 1. It is assumed that highlights are turned off by the View printer driver at the end of each line, so if one spans more than a single line it is restarted on each of the lines.
- **Bold text:** Converted to highlight 2. The same assumption about highlights is made as for underlining.
- **Page breaks:** Both conditional and unconditional are covered.
- **Dynamic page numbers:** Translated to View's |P.

The main features that are not transferred by this program are headers, footers and justification. If justification is needed the text should be reformatted within View. Headers and footers will have to be redefined in the View document.

It should also be remembered that View does not support columns of text so each Inter-Word column page becomes a separate page after the translation to a View file.

Features of Inter-Word that are translated to Wordwise, Wordwise Plus and Mini Office II

These files contain the same information as that transferred to View with the following differences:

- **Rulers:** Translated into a combination of LM, LL and DT commands.
- **Right aligned text:** Ignored.
- **Underlining, bold and dotted highlights:** Translated into the OC (Wordwise) or CC (Mini Office II) commands, using the codes set into the document's Inter-Word Control Codes menu.
- **Dynamic page numbers:** Become the PP command.
- **Justification:** Carried through in most cases.

Features of Inter-Word that are translated to Wordwise Plus

The Wordwise Plus features that are translated are the same except that underlining is translated into the US and UE commands, and bold text becomes the DS and DE commands. This option is to allow the codes to be translated back by next month's program.

If you are using a non-standard printer and have the correct codes set in the Inter-Word document, it is generally best to use the Wordwise option, even for Wordwise Plus.

```
 1090 IF B%=ASC">" THEN lm%=(lm% MOD 256
)+I%
 1100 IF B%=ASC"*" THEN trule%(tno%)=I%:
tno%=tno%+1:NEXT
 1110 IF B%<>ASC"<" THEN NEXT
 1120 rm%=I%:I%=250
 1130 NEXT
 1140 trule%(tno%)=&87
 1150 IF option$="1" THEN PROCiwruler EL
SE PROCwwruler
 1160 ENDPROC
 1170 :
 1180 DEFPROCiwruler
 1190 BPUT#D%,&85:BPUT#D%,&86
 1200 BPUT#D%,(lm% MOD 256)
 1210 BPUT#D%,((lm%+rm%+1) MOD 256)
 1220 BPUT#D%,(lm% MOD 256)
 1230 BPUT#D%,0:BPUT#D%,0
 1240 FOR I%=0 TO tno%
 1250 IF trule%(I%)=&87 THEN BPUT#D%,&87
:GOTO 1270
 1260 BPUT#D%,((trule%(I%)+lm%+1) MOD 25
6)
 1270 NEXT
 1280 REPEAT:A%=BGET#H%:UNTIL A%=13
 1290 ENDPROC
 1300 :
 1310 DEFPROCpar
 1320 code$=CHR$(BGET#H%)+CHR$(BGET#H%)
 1330 pp%=PTR#H%:par$=""
 1340 B%=BGET#H%
 1350 IF B%=13 THEN ENDPROC
 1360 IF B%<>32 THEN par$=par$+CHR$(B%)
 1370 GOTO 1340
 1380 :
 1390 DEFPROCembedtext
 1400 PROCpar
 1410 IF code$="LM" THEN lm%=VAL(par$):E
NDPROC
 1420 IF code$="CE" THEN PROCisfirst(16)
:cent%=1:left%=0:PTR#H%=pp%:ENDPROC
 1430 IF code$="RJ" THEN PROCisfirst(17)
:right%=1:left%=0:PTR#H%=pp%:ENDPROC
 1440 IF code$="LJ" THEN left%=1:PTR#H%=
pp%:ENDPROC
 1450 IF code$<>"PE" THEN ENDPROC
 1460 IF par$="" THEN BPUT#D%,&81:BPUT#D
%,1:BPUT#D%,&87:ENDPROC
 1470 BPUT#D%,2:BPUT#D%,1:BPUT#D%,(VAL(p
ar$)-1)
 1480 ENDPROC
 1490 :
 1500 DEFPROCiwhead
 1510 FOR G%=1 TO 13:READ A$:BPUT#D%,(12
8+ASC(A$)):NEXT
 1520 BPUT#D%,1
 1530 FOR G%=1 TO 24:BPUT#D%,0:NEXT
 1540 FOR G%=1 TO 24:READ A%:BPUT#D%,A%:
NEXT
 1550 ls%=ls%+1
 1560 BPUT#D%,((tm%+1) DIV ls%)
 1570 BPUT#D%,((tm%+hm%+1) DIV ls%)
 1580 BPUT#D%,((pl%-fm%-bm%-1) DIV ls%)
 1590 BPUT#D%,((pl%-bm%) DIV ls%)
 1600 BPUT#D%,((pl% DIV ls%)+1)
 1610 FOR G%=1 TO 6:READ A%:BPUT#D%,A%:N
EXT
 1620 BPUT#D%,pb%
 1630 FOR G%=1 TO 30:READ A%:BPUT#D%,A%:
NEXT
 1640 FOR G%=1 TO 32:BPUT#D%,0:NEXT
 1650 FOR G%=1 TO LEN(dest$):BPUT#D%,ASC
(MID$(dest$,G%,1)):NEXT
 1660 BPUT#D%,13
 1670 FOR G%=1 TO 95-LEN(dest$):BPUT#D%,
0:NEXT
 1680 FOR G%=1 TO 3:BPUT#D%,&AA:NEXT
 1690 FOR G%=1 TO 21:BPUT#D%,0:NEXT
 1700 BPUT#D%,2:BPUT#D%,&1B:BPUT#D%,&34:
FOR G%=1 TO 12:BPUT#D%,0:NEXT
 1710 BPUT#D%,2:BPUT#D%,&1B:BPUT#D%,&35:
FOR G%=1 TO 12:BPUT#D%,0:NEXT
 1720 BPUT#D%,3:BPUT#D%,&1B:BPUT#D%,&2D:
BPUT#D%,1:FOR G%=1 TO 11:BPUT#D%,0:NEXT
 1730 BPUT#D%,3:BPUT#D%,&1B:BPUT#D%,&2D:
FOR G%=1 TO 42:BPUT#D%,0:NEXT
 1740 BPUT#D%,2:BPUT#D%,&1B:BPUT#D%,&45:
FOR G%=1 TO 12:BPUT#D%,0:NEXT
 1750 BPUT#D%,2:BPUT#D%,&1B:BPUT#D%,&46:
FOR G%=1 TO 12:BPUT#D%,0:NEXT
 1760 BPUT#D%,1:BPUT#D%,&23
 1770 FOR 6%=1 TO 14:BPUT#D%,0:NEXT
 1780 FOR G%=1 TO 12:READ A%:BPUT#D%,A%:
NEXT
 1790 BPUT#D%,((hm%+1) DIV ls%)
 1800 BPUT#D%,((hm%+tm%+1) DIV ls%)
 1810 BPUT#D%,((bm%+fm%+1) DIV ls%)
 1820 BPUT#D%,((pl%-bm%) DIV ls%)
 1830 BPUT#D%,(pl% DIV ls%)
 1840 BPUT#D%,1:BPUT#D%,ls%
 1850 BPUT#D%,10
 1860 FOR G%=1 TO 37:BPUT#D%,0:NEXT
```

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```
1870 FOR G%=1 TO 7:READ A%:BPUT#D%,A%:N
EXT
 1880 FOR G%=1 TO 56:BPUT#D%,0:NEXT
 1890 BPUT#D%,&EC:BPUT#D%,&FF:BPUT#D%,2
 1900 FOR G%=1 TO 253:BPUT#D%,0:NEXT
 1910 FOR G%=1 TO 55:READ A%:BPUT#D%,A%:
NEXT
 1920 ENDPROC
 1930 :
 1940 DEFPROCwwhead
 1950 IF pb%=16 THEN BPUT#D%,2:BPUT#D%,A
SC"E":BPUT#D%,ASC"P":BPUT#D%,2:BPUT#D%,A
SC"D":BPUT#D%,ASC"F":IF option$="4" THEN
 BPUT#D%,3:BPUT#D%,13 ELSE BPUT#D%,13
 1960 PROCcommand("LL74"):PROCcommand("D
T8,16,24,32,40,48,56,64,72")
 1970 PROCcommand("TS9"):PROCcommand("BS
9")
 1980 ENDPROC
 1990 :
 2000 DEFPROCcommand(text$)
 2010 BPUT#D%,2
 2020 FOR Q%=1 TO LEN(text$)
 2030 BPUT#D%,ASC(MID$(text$,Q%,1))
 2040 NEXT
 2050 BPUT#D%,term%
 2060 ENDPROC
 2070 :
 2080 DEFPROCwwtext
 2090 IF J%=oldJ% THEN GOTO 2110
 2100 IF J%=0 THEN PROCcommand(nojust$)
ELSE PROCcommand(just$)
 2110 B%=BGET#H%
 2120 IF B%=&81 THEN PROCruler:GOTO 2110
 2130 IF B%=&80 THEN PROCdecode:GOTO 211
0
 2140 IF B%<>13 THEN cr%=0
 2150 IF B%>31 THEN BPUT#D%,B%:GOTO 2110
 2160 IF B%=&1C THEN PROCwwul:GOTO 2110
 2170 IF B%=&1D THEN PROCwwbold:GOTO 211
0
 2180 IF B%=9 THEN BPUT#D%,tab%:GOTO 211
0
 2190 IF B%=&1A OR B%=&B THEN GOTO 2110
 2200 IF hbold%=1 THEN PROCwwbold
 2210 IF uline%=1 THEN PROCwwul
 2220 IF left%=1 THEN BPUT#D%,13:cr%=1
 2230 IF cent%=1 THEN BPUT#D%,13:cr%=1
 2240 IF right%=1 THEN BPUT#D%,13:cr%=1
 2250 IF length%=1 AND cr%=0 THEN BPUT#D
%,13
 2260 IF length%=1 THEN BPUT#D%,13:cr%=1
 2270 IF left%=0 AND cent%=0 AND right%=
0 THEN BPUT#D%,32
 2280 ENDPROC
 2290 :
 2300 DEFPROCwwbold
 2310 hbold%=(hbold%+1) MOD 2
 2320 IF hbold%=1 AND option$="3" THEN P
ROCcommand("DS"):ENDPROC
 2330 IF hbold%=0 AND option$="3" THEN P
ROCcommand("DE"):ENDPROC
 2340 IF hbold%=1 AND option$<>"3" THEN
PROCcommand(C$+"C27,69"):ENDPROC
 2350 IF hbold%=0 AND option$<>"3" THEN
PROCcommand(C$+"C27,70"):ENDPROC
 2360 :
 2370 DEFPROCwwul
 2380 uline%=(uline%+1) MOD 2
 2390 IF uline%=1 AND option$="3" THEN P
ROCcommand("US"):ENDPROC
 2400 IF uline%=0 AND option$="3" THEN P
ROCcommand("UE"):ENDPROC
 2410 IF uline%=1 AND option$<>"3" THEN
PROCcommand(C$+"C27,45,1"):ENDPROC
 2420 IF uline%=0 AND option$<>"3" THEN
PROCcommand(C$+"C27,45,0"):ENDPROC
 2430 :
 2440 DEFPROCwwruler
 2450 PROCcommand("LL"+STR$(rm%))
 2460 IF tno%<1 THEN ENDPROC
 2470 dt$="DT"
 2480 FOR I%=0 TO tno%-1
 2490 dt$=dt$+STR$(trule%(I%))+","
 2500 NEXT
 2510 dt$=LEFT$(dt$,LEN(dt$)-1)
 2520 PROCcommand(dt$)
 2530 ENDPROC
 2540 :
 2550 DEFPROCdecode
 2560 PROCpar
 2570 IF code$="CE" THEN cent%=1:PROCcom
mand("CE"):PTR#H%=pp%:ENDPROC
 2580 IF code$="LJ" THEN left%=1:ENDPROC
 2590 IF code$="RJ" THEN right%=1:ENDPRO
C
 2600 IF code$="PL" THEN PROCcommand("PL
"+par$):ENDPROC
 2610 IF code$="LS" THEN PROCcommand("LS
"+par$):ENDPROC
 2620 IF code$="LM" THEN PROCcommand("LM
"+par$):ENDPROC
 2630 IF code$="TM" THEN tm%=VAL(par$):P
ROCcommand("TS"+STR$(tm%+hm%+1)):ENDPROC
 2640 IF code$="HM" THEN hm%=VAL(par$):P
ROCcommand("TS"+STR$(tm%+hm%+1)):ENDPROC
 2650 IF code$="FM" THEN fm%=VAL(par$):P
ROCcommand("BS"+STR$(fm%+bm%+1)):ENDPROC
 2660 IF code$="BM" THEN bm%=VAL(par$):P
ROCcommand("BS"+STR$(fm%+bm%+1)):ENDPROC
 2670 IF code$<>"PE" THEN ENDPROC
 2680 IF par$="" THEN PROCcommand("BP")
ELSE PROCcommand("CP"+par$)
 2690 ENDPROC
 2700 :
 2710 DATA "C","h","a","z","J","e","z","
J","i","m","I","a","n"
 2720 DATA 2,0,0,&19,0,1,0,2,0,2,0,3,&25
,3,0,0,&26,3,&37,3,0,0,0,0
 2730 DATA 14,32,80,4,12,64
 2740 DATA 0,7,0,&19,4,50,&C0,0,80,0,&55
,0,&21,&22,0,0,2,4,0,&21,&22,1,0,2,4,0,&
21,&22,1,0
 2750 DATA 1,0,0,1,1,&7C,0,1,255,0,0,0
 2760 DATA 1,0,33,34,1,0,&A1
 2770 DATA &22,&12,0,&85,&86,4,&4A,4,&40
,0,&87,32,32,32,32,32,32,255,255,&85,&86
 2780 DATA 0,74,0,0,0,7,15,23,31,39,47,5
5,63,71,&87,255,255,&85,&86
 2790 DATA 0,74,0,0,0,7,15,23,31,39,47,5
5,63,71,&87
```

Get it right!

```
  10 =    0 0                             1360 = 93EB D 1840 = 9AFE C 2320 = 3D8B F
  20 =    0 0                             1370 = F368 9 1850 = 2314 A 2330 = 6871 9
  30 =    0 0                             1380 = 9719 C 1860 = D504 C 2340 = FD29 5
  40 = E76A A                             1390 = 1A0E 2 1870 = 634C 1 2350 = D626 4
  50 = 76AC 1  490 = E529 3               1400 = CCE3 8 1880 = 4BB5 8 2360 = 9719 E
  60 = 4D42 9  500 = 49FD C  930 = ED0F 8 1410 = 3FE9 D 1890 = 5812 3 2370 = 8564 5
  70 = EF3A 6  510 = BCD0 3  940 = 7139 7 1420 = C824 2 1900 = 2068 E 2380 = 800C 9
  80 = DCC4 2  520 = 6792 0  950 = 3036 E 1430 = AEC5 B 1910 =   63 0 2390 =  9BE 3
  90 = 2B6E 8  530 =  E11 F  960 = 6C17 E 1440 = DA0C 0 1920 = ED0F A 2400 = 5C44 9
 100 = C830 4  540 = 7803 C  970 = 6BF9 7 1450 = E98B 4 1930 = 9719 3 2410 = 95E2 B
 110 = 7A85 C  550 = 898F 9  980 = 8D52 1 1460 = B0F1 3 1940 = 60C6 3 2420 = 785F A
 120 = B1D8 9  560 = BC0A B  990 = 692C 1 1470 = 71D0 5 1950 = 3B4D D 2430 = 9719 3
 130 = DF50 6  570 = 98A9 6 1000 = 6ADB A 1480 = ED0F 1 1960 = 4B18 8 2440 = DC40 E
 140 = 3DF1 C  580 = 7CCC E 1010 = C25D 5 1490 = 9719 A 1970 = E34E 0 2450 = 4038 D
 150 = E08E 4  590 = A8EF 3 1020 = ED0F A 1500 = FAE1 A 1980 = ED0F 9 2460 = 11F1 7
 160 = 80FB 5  600 = A88E C 1030 = 9719 E 1510 = E0E2 5 1990 = 9719 0 2470 =  45F F
 170 = 6CE5 2  610 = A193 C 1040 = 52AD 0 1520 = AD71 5 2000 = 85AC D 2480 = DF57 D
 180 = 6561 6  620 = FC2A 9 1050 = 3D54 C 1530 = BC82 9 2010 = 9D12 A 2490 =   24 2
 190 = D8D1 3  630 = 5EC1 7 1060 = 577D 7 1540 = DAE9 0 2020 = D1FD A 2500 = 2C83 0
 200 = EC23 9  640 = 214B 8 1070 = 3116 A 1550 = 99D4 B 2030 = D903 6 2510 = CEF7 5
 210 = F133 8  650 = 226C 5 1080 = 6792 0 1560 =   31 9 2040 = 2C83 8 2520 = 18E8 2
 220 = 6047 1  660 = 9719 2 1090 = 6A8E 5 1570 = 4019 1 2050 = 54B9 E 2530 = ED0F 9
 230 = CDB5 E  670 = 4CBB D 1100 = EF57 B 1580 = 4F16 6 2060 = ED0F C 2540 = 9719 5
 240 = BFBA 1  680 = 2FA6 9 1110 = BB5E C 1590 = E27A C 2070 = 9719 C 2550 = C271 A
 250 = 6656 D  690 = E53F A 1120 = 346F 5 1600 = B3F9 B 2080 = 9F89 E 2560 = CCE3 9
 260 = F79E 8  700 = CA7B 1 1130 = 2C83 8 1610 = CB68 1 2090 = BB08 D 2570 = 109A 7
 270 =  DF8 3  710 = 24AD 9 1140 = 9FFB 8 1620 = 3686 F 2100 = EDD7 A 2580 = C814 A
 280 = 5EA6 C  720 = 3532 A 1150 = 9131 B 1630 = 4AD9 F 2110 = 6792 2 2590 = 2C93 5
 290 = 8F2F 4  730 = 9EE3 6 1160 = ED0F 6 1640 = 1774 8 2120 = 6B13 B 2600 = F136 E
 300 = BFBA F  740 = FD2E A 1170 = 9719 C 1650 = 2D50 6 2130 = D575 C 2610 =  CBF B
 310 = 3FC4 4  750 = 9719 3 1180 = D9B3 8 1660 = 1377 F 2140 = B879 1 2620 = 2C0F E
 320 = 45E2 5  760 = 2810 9 1190 = B7F9 9 1670 = ED3F E 2150 =   68 6 2630 = 7117 3
 330 = BFBA 0  770 = FEA3 4 1200 = 8A87 0 1680 = F0B7 1 2160 = 3503 D 2640 =  D8A 8
 340 = 6792 7  780 = 5AF4 6 1210 = EB2C C 1690 = 7EF2 A 2170 = C982 3 2650 = 1C63 1
 350 = 6F1D 1  790 = 9719 2 1220 = 8A87 F 1700 =  327 7 2180 =  B97 B 2660 = D84A 9
 360 =  12C E  800 = AA5F 2 1230 = 7F79 2 1710 = 6EFF 2 2190 = 36CC 6 2670 = E98B C
 370 = 991A 8  810 = 800C C 1240 = BD0E A 1720 = 201A 4 2200 = 1780 D 2680 = DB06 F
 380 = C22C 7  820 = 8EA3 D 1250 = 24CC 6 1730 =  337 D 2210 = 4684 7 2690 = ED0F 7
 390 = D42D B  830 = 9719 C 1260 = 3DB5 9 1740 = 45EF 1 2220 = FC2A A 2700 = 9719 2
 400 = B86C 1  840 = A15C E 1270 = 2C83 6 1750 = F387 F 2230 =   77 D 2710 = 2FF5 B
 410 = AF94 C  850 = 4941 8 1280 = 381B 4 1760 =  C98 C 2240 = AFB3 2 2720 = 7536 F
 420 = BE68 C  860 = 47DF E 1290 = ED0F D 1770 = C478 0 2250 = 764F D 2730 = BDA2 3
 430 = 6792 E  870 = ED0F D 1300 = 9719 1 1780 = 2B74 0 2260 =  CBD B 2740 = B64D A
 440 = 7F8F F  880 = 9719 2 1310 = DA7B 9 1790 = 1872 A 2270 = 5EC1 5 2750 = 1F1D 5
 450 = B324 4  890 = C6B1 3 1320 = 89FE A 1800 = 82C3 4 2280 = ED0F E 2760 = 9B9C 8
 460 =  3CF 4  900 = CCE3 8 1330 = F6D2 B 1810 = B865 3 2290 = 9719 7 2770 = 25E7 8
 470 = 9774 3  910 = A169 A 1340 = 6792 9 1820 = E27A A 2300 = B9F0 A 2780 = 5392 B
 480 = 41ED F  920 = BEB7 2 1350 = 74D6 C 1830 = B740 2 2310 = FEA3 A 2790 = 6412 1
```

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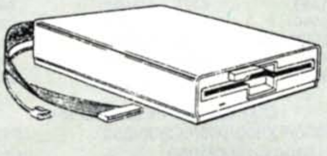

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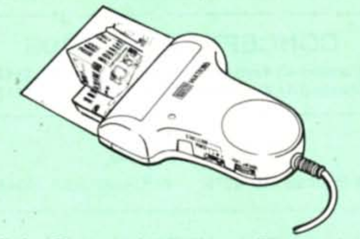

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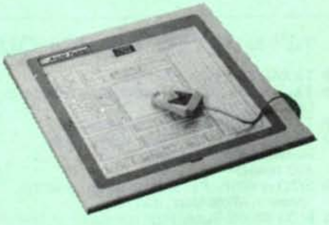
0923 37774 ext 223/203/201.

Archi Graphic Tablet



This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

Graphics programs such as Artisan, Pro Artisan, AutoSketch, Oak DTP, and the RiscOS Draw, Paint and DTP packages are considerably enhanced by the use of the graphics table as opposed to the mouse, although it can, of course, be used with any other mouse driven application.

The software allows the user to define how much of the tabler's 12" x 12" working area to use, allowing very fine control when drawing freehand or tracing from a variety of differently sized drawings, diagrams, photographs, etc.

The tablet driver is compatible with all Archimedes machines, and with both Arthur and RiscOS operating systems.

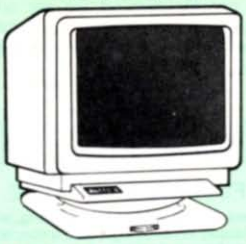
The pointer is moved via a four button puck complete with transparent lens and crosshairs for optimum accuracy. Three of the buttons emulate the Archimedes mouse buttons precisely, the fourth being used for special functions such as setting the position and size of the active working area. The buttons may be remapped to allow the relationship between tablet and mouse buttons to be redefined, should this be required.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

Special Price £249 (carr. £4)
(Price includes Tablet, Leads & Software)
Stylus Optional Extra **£29**

Continued→ → → → → → → → →

MONITORS



MICROVITEC 14"

● **1431** – Standard resolution as used on the BBC television computer programme	£175
● **1451** – Medium resolution, suitable for word processing in mode 0	£219
● **1455** – MS Medium resolution, ideal for Archimedes	£220
● **1441** – High res, exceeds the capabilities of the BBC Micro	£359
● **1431AP** RGB + PAL and AUDIO	£199
● **1451AP** RGB + PAL and AUDIO	£255
● **2030 CS** 20" Med Res	£380
● **2040 CS** 20" Hi Res	£675
● Dust Cover for Microvitecs	£5.50
● **Touchtec 501 Touch Screen**	£239

14" MULTISCAN COLOUR

● **TAXAN** Multisync 770 Plus	£389
● **TAXAN** 770 LR Low Radiation, autoscanning Ultra High Res	£415
● **TAXAN** Multiscan 870 16" Monitor	£575
● **TAXAN** Viking 19" Paper White, High Resolution (1152 x 896 with Archi 400 series)	£799
● **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89	£389
● **EIZO** 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch	£469

TAXAN 12"

● Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch	£269

PHILIPS

● **BM7502** 12" Hi-res Green Monitor	£64
● **BM7522** 12" Hi-res Amber Monitor	£68
● **CM8833** 14" Med. Res Colour Monitor	£189

STAR BUY

● **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £185

Dust Cover for Philips Monitors	£6

(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

Price £12

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117

PLOTTERS

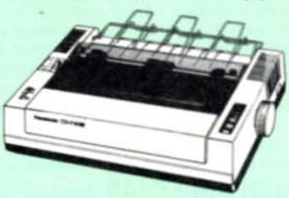
● Plotmate A4S	£379	● Plotmate A3M	£549

Roland Plotters

(Official Roland Appointed Distributor)

● **DXY 880A**	£499	● **DXY 1100**	£615
● **DXY 1200**	£835	● **DXY 1300**	£1015

Panasonic KX-P1081



SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

● **KX-P1124** 24pin 80col. 192/63 CPS	£225
● **KX-P1180** 9pin 80col. 144/38 CPS	£146
● **KX-P1540** 24pin 136col. 240/80 CPS	£435
● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£355

● **Panasonic KX-P4450i** LASER PRINTER Latest technology at Watford's special offer price **£1,325**

● Spare Toner	£29	● A4 Feeder	£55
● Drum Unit	£149	● Developer	£115
● 1MB RAM Board			£299

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12 4K buffer Board for 1081	£55
P42 32K buffer Chip for 1592/1595	£16
P43 32K Buffer Chip for 1540/1124	£16

Serial Interfaces

P17 P1081/1592	£32	P19 P1124/1180	£55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£8
P115 for KX-P1180	£8
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

INTEGREX COLOUR JET

● Colour Jet 132 Printer	£515
● Paper Roll	£6.50
● Screen Dump Software	£10
● Colour Cartridge	£16.50
● Black Cartridge	£10.35
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£123
NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer	£2,695

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

£225

Pinwriter Serial Interface (optional)	£55
P2200 Cut Sheet Feeder	£59
Additional Font Cartridge	£25

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	£439	**NEC P7+** 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		
NEC Ribbons for		P6 **£8;**	P7 **£9.50**

Hewlett-Packard Printers

HP Quiet Jet Plus	£425
HP Desk Jet Plus	£525
HP Paint Jet Colour	£649
HP LaserJet Series IIP	£825
HP LaserJet Series II	£1275

Star Printers

Star LC10	£139	LC10 Colour	£195
Star LC24-10	£215	XB24-10 Colour	£410
NB24-10	£410	XB-10 Colour Kit	£24
LC10 Colour Ribbon	£5	Cut Sheet Feeder	£55

EPSON PRINTERS

EX800	£410	LQ550	£259
EX1000	£564	LQ860 Colour	£539
FX850	£310	LQ1050	£549
FX1050	£395	LQ1060	£679
FX1060	£679	LQ2550+	£895
GQ3500 Laser	£999	LX400	£135
LQ400	£205	LX850	£185
LQ850	£405	SQ2500	£899

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

ACCESSORIES

● EX800/1000 Colour Option	£55
● EX800/1000 Colour Ribbon	£14
● LQ2500 Colour Option	£65

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 1 metre	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 1 metre	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

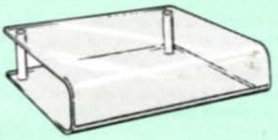
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

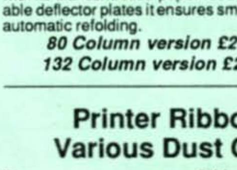
Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and refold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)
132 Column version £26 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.95	£4.50
RX/FX80/MX80	£3.00	–
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£6.75	£5.00
RX/FX80/85/800/MX80	£3.25	–
RX/FX100/1000	£5.00	–
Kaga/Taxan KP810/815	£4.90	£5.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£7.00	£5.50
LX80/86/800/850	£3.25	£4.50
M1009/GLP	£3.80	£3.75
NEC P2200	£6.00	£5.00
Panasonic KX1080/81	£3.50	£4.75
Panasonic KX-1124	£8.00	£5.00
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

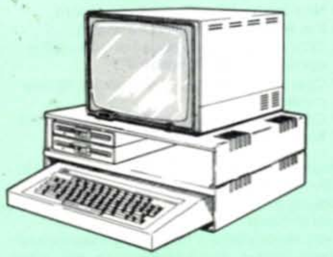
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



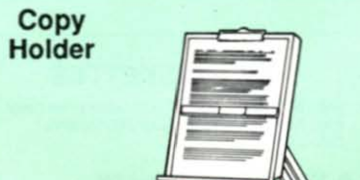
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£19**
Compact AB Switch RS232	**£18**

(Cables extra at £6 each)

MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £149 (carr £5)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

THE EPSON RX-FX-KAGA

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you are with all sorts of printouts to show its capabilites – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

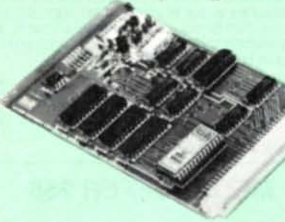
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser

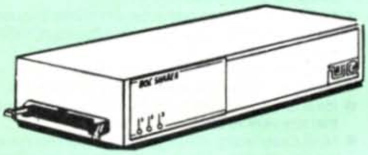


Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £249

A Set of Colour Filters for colour image grabbing using a video camera	£16

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

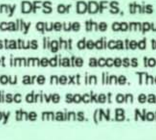
Launch Price : **£65** Price includes 3 Cables

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	**£16.00**
● Watford DFS Kit complete	**£69.00**
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	**£12.00**
● DFS Manual (comprehensive)	**£6.95**
● Acorn DNFS ROM	**£17.00**
● Acorn ADFS ROM only	**£25.00**
● Acorn 1772 DFS ROM Kit	**£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Watford's MkII 1770

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

● SPECIAL PRICE	**£44.00**
● DDFS Manual	(No VAT) **£6.95**
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£25.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40 Track 744)*	***£5***
● *10 x 5.25" D/S D/D 40 Track 745)*	***£6.50***
● *10 x 5.25" S/S D/D 80 Track (746)*	***£8***
● *10 x 5.25" D/S D/D 80 Track (747)*	***£9***
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	***£14***
● *10 x 3.25" S/S D/D 40/80 Track*	***£9***
● *10 x 3.25" D/S D/D 40/80 Track*	***£9***
● *10 x 3.5" High Density*	***£25***

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 x **M3** 3.5" D/S D/D 80 Track*	***£9***
● *10 x **M9** 3.5" D/S High Density*	***£22***
● *10 x **M4** 5.25" S/S D/D 40 Track*	***£5***
● *10 x **M5** 5.25" D/S D/D 40 Track*	***£7***
● *10 x **M7** 5.25" D/S D/D 80 Track*	***£9***
● *10 x **M8** 5.25" D/S H/D Hi-Density*	***£14***
● *3" Double Sided*	***£2.50** each*

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

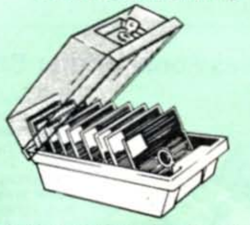
Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£30	£35	£40
● With Sleeves	£33	£38	£43

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

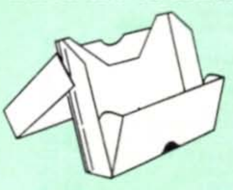


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	£4.95
● **M85** – holds up to 95 5.25" discs	£6.95
● **M25*** – holds up to 25 3.5" discs	£4.95
● **M50** – holds 50 3.5" discs	£6.50
● **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. **Only £2.00**

DISC ALBUMS

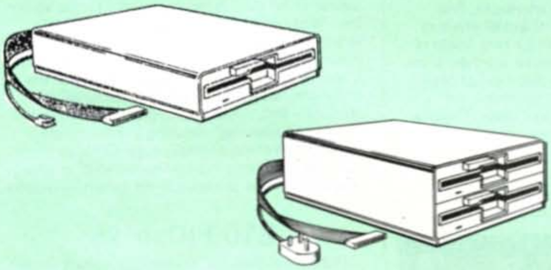
Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.** We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £75	CLD400 £168	CS 400S £85	CD400 £188
800K (1,44M		CLD 800S £153		CD 800S £163

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5.25" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

- ● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- ● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- ● A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

● CLS35 400K Unit £65 **● CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

● CS35 Single 400K £85 **● CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

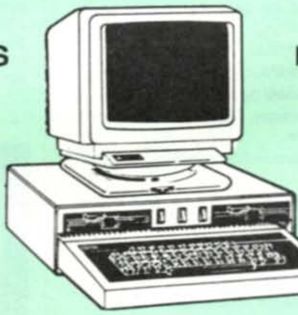
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£369** (carr £9)

CDPM 800S

DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST
MOUSE Mk II

Quest Mouse II & Quest Paint	£58
Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
Quest Mouse II only	£29
Quest Paint Software only	£34
Quest Font Disc	£15
Quest Mouse Mat (Red or Blue or Green please specify)	£3
Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22
GXR ROM for the BBC Micro (P.S. Quest Paint is not compatible with BBC Compact)	£22

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi
TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£52

THE NEW Mk III AMX MOUSE

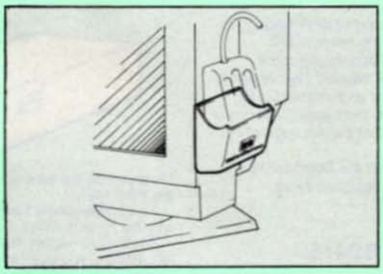
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it. A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of Stop Press and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in Wordwise and View files plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, detailed elsewhere in our advert, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

For convenience all types of file may be stored on the same disc, with the software intelligently and transparently distinguishing between them. Filenames are picked off the screen with the mouse, dispensing with keyboard entry wherever possible.

"The Wapping Editor combines sophistication with ease of use and power with simplicity, to make it the most comprehensive and user-friendly DTP system ever likely to be written for the Beeb".

Wapping Editor Software Pack	£69
Wapping Editor plus Mouse	£89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

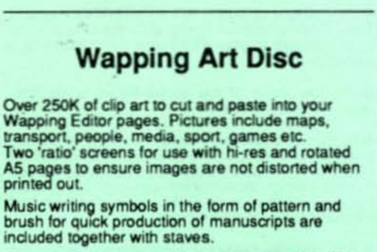
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

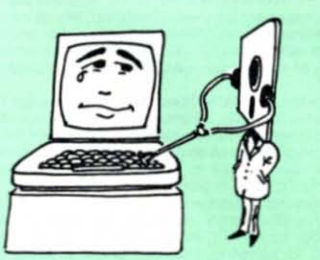
Beeb HandScan & Firmware	£135

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms see the feature in our advert.

NEW

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

Continued→ → → → → → → → →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	£36
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

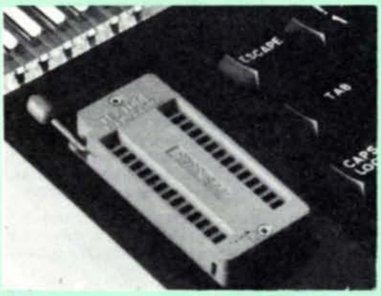
VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	£25

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the Keyboard.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	£11
● Spare Cartridges	£2.50
● Spare Rack	£1.50

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8**; Quad **£12**

16K DISC RAM

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

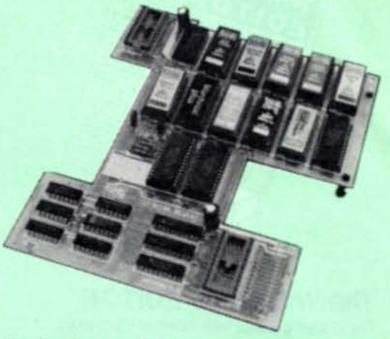
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£32** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

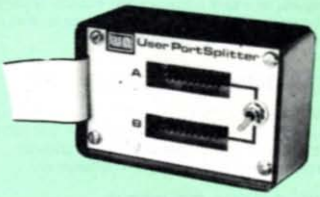
FINANCE AVAILABLE

In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details please telephone: 0923 37774 ext 223/203/201.

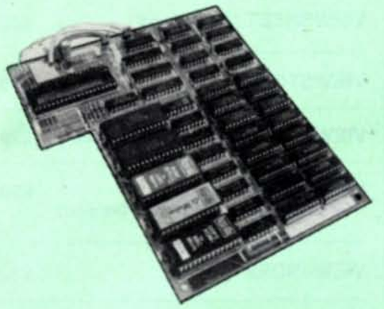
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 6 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	£48
● ROM/RAM card with 64k dynamic RAM	£65
● ROM/RAM card with a massive 128k dynamic RAM	£109

(carriage on ROM-RAM Card £3)

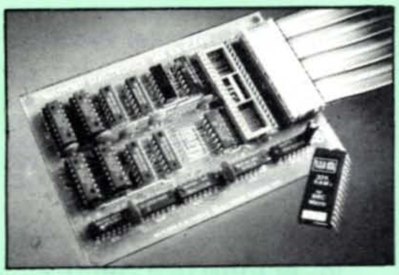
OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	£9
● 16k Dynamic RAM for Upgrade	£13
● Battery backup	£3
● Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32k SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (Carr £3)

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Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms. See the feature in our advert.

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Popular Educational Software

● Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
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Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic.

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6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£11.00**

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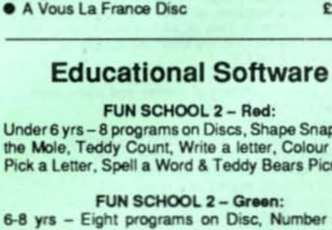
Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£11.25**

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £3)

Continued→ → → → → → → → →

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DISC DOCTOR	£28
TERMI	£25
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CREDIT CARD 24 HOUR
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Wordwise plus £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

HI-WORDWISE-PLUS DISC:	£5
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Inter SHEET ONLY £37

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MINI OFFICE II

DISC Version for BBC B & B+	£14.00
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DISC Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc)

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Advanced Disc Toolkit	£28
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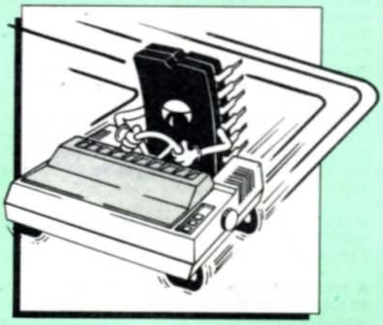
Advanced 1770 DFS Master	£28
Advanced File Manager	£24
Advanced Control Panel	£28

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

VIEW 3.0 ROM	**£45**
VIEW PROFESSIONAL	**£50**
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW packs 1 & 2	£65

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
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CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

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EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

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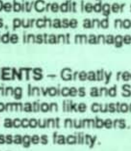
STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

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The Advanced Reference Manual for the BBC Master

At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

- Memory Organisation
- Slow data bus
- Detailed circuit description
- Keyboard controller
- Screen display
- User port
- Serial processor
- Peripheral bus controller
- 1 Mhz Bus
- Machine operating system
- Second processors – Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worthwhile addition to any Master owner's library.

All this for just £17 (NO VAT)

NEW

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)
Example programs on Disc £4.95

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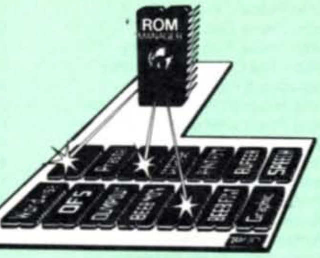
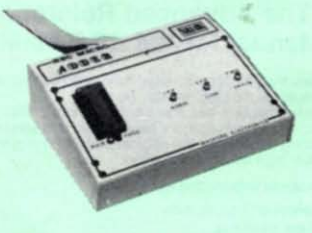
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs . Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
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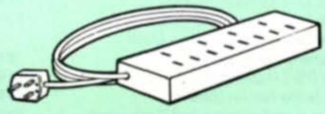

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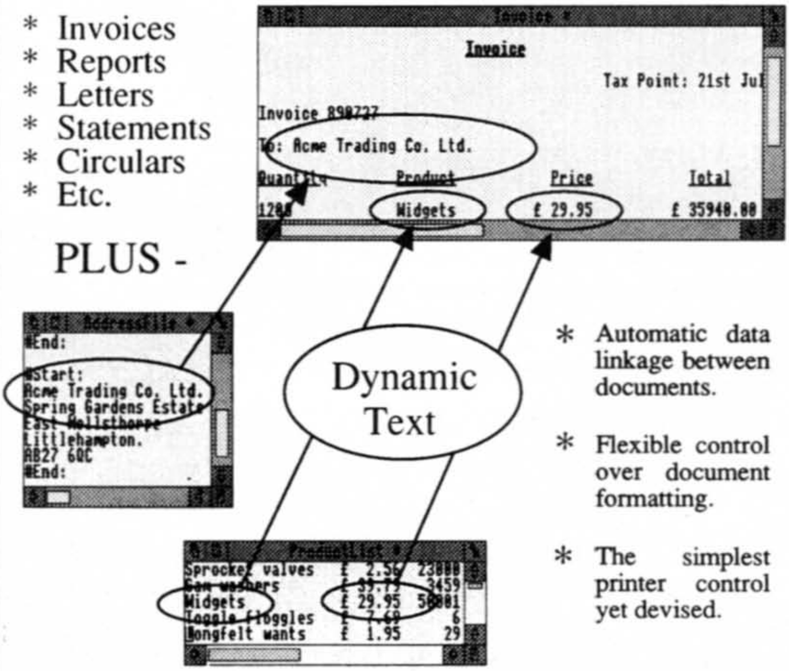

```
Invoice *
Invoice
                                  Tax Point: 21st Jul
Invoice 890727
To: Acme Trading Co. Ltd.
Quantity     Product      Price        Total
1200         Widgets      £ 29.95      £ 35940.00
```

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AddressFile *
#End:

#Start:
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Be a movie mogul

Terry Blunt investigates the use of CAD for making animated films

MOGUL is an application that works with the Euclid package to add easy motion control of Euclid objects so that you can create your own animated films. While it is possible to build up films without Mogul, the job is rather slow and complicated and I wouldn't recommend it unless you really enjoy working at a nuts and bolts level. The new application, like the revised version of Euclid, is fully multi-tasking.

On the disc you get !Mogul, a new !Projector, several demo files and a couple of text files with information not included in the manual. !Readme in the root directory is quite important, and you should study it before using Mogul, particularly if you have a 1Mb machine, where the memory problems it covers are more likely to be significant.

However, the !Readme file in the Misc directory is likely to be of less interest and mainly concerns a couple of older programs included as extras from an interest point of view.

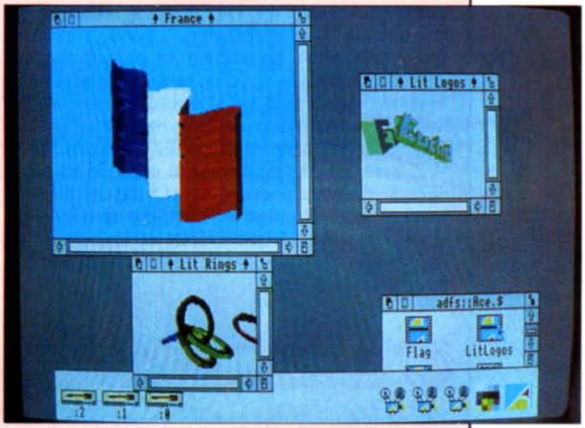
The demo files on the disc centre around a set piece consisting of a table, box and two chairs – as with the original Euclid disc. Although these simple objects are ideal for early instruction, they in no way do justice to the capabilities of Euclid and Mogul, erroneously giving the impression that only blocky objects can be moved and a little jerkily at that.

I would have thought with the disc space available it a good idea if Ace had included as an appetiser one of its sophisticated films, such as the French national flag waving in the breeze or the flock of seagulls flying lazily around.

The manual with my review copy was a small booklet outlining Mogul's basic principles and operation. There is a step-by-step description of how to set up the demo file included on the disc so that the box and one of the chairs go through a short movement sequence. Unfortunately, there is a small error in the instructions that has the hilarious result of making the box appear to rotate through the table.

Ace takes pains to point out that Mogul is an extension of Euclid, and cannot be used without it. You are also expected to have a working understanding of Euclid, hence the sparseness

➤



Running three films simultaneously

The Bi s
Animation using Euclid and Mogul by Malc thorpe

The birds: Brilliant animation with a sprite backdrop

Demos

On this month's 3.5in subscription disc we have included one of Ace's demonstration films and a projector so you can see just how good Mogul can be.

> *Mogul works in a similar way to that used by cartoon animators*

➤

of the instructions. However, a new manual for the whole Euclid system would be nice.

Euclid itself senses the presence of Mogul if it's on the same disc or is on one that has been previously seen, and loads it automatically. Ace advise you to put both on the same disc for your working copy. I found that there was enough room for both and the projector, and even the colourtrans module from Apps1, saving a lot of disc swapping if you only have a single floppy drive.

Mogul works in a similar way to that used by cartoon animators, in that you set up a number of so-called key frames by placing the objects at the positions and orientations that you want to represent the main features of the action. Mogul then creates all the necessary intermediate ones, calculating the required adjustments for the objects that are moving. This is a straight line interpolation, so any film of objects moving in arcs would have to be done a frame at a time. Perhaps Ace could be tempted to look at the feasibility of an extension to cover this.

Objects can only rotate on the standard 3D X, Y, Z axes and it takes a lot of practice to get it right if you want odd angles of rotation. I would have liked a method of creating a new axis somehow so I could then rotate an object on this rather than having to work continuously with all three standard axes.

Sprite backdrops

You can also change camera angles throughout your film, and panning round a moving scene produces pretty stunning effects. This is ideal for giving different views of a repeating sequence of object movements, particularly where demonstrations are being used as a teaching aid. A familiar application that comes to mind is the internal combustion engine, I'm sure that a moving 3D display would be much more informative that the static cut-away views often used.

In addition to all this, you can use a sprite as a backdrop to your film. Careful use of this feature should enable you to reduce the number of objects in the main film, so reducing the disc space required.

In the main, using Mogul is quite easy and fairly obvious – much easier than using the main object creation parts of Euclid. When setting up the motion for an object you are presented with a window which already has a frame chart marked in, so that you can position your key frames at the exact times you want.

Key frames carry letters A, B, C... to a total of only 20, but Ace may extend this in an upgrade. You can't delete marked frames either, but this is not really a problem, as you can re-allocate them. To set marked frames in the chart you simply move the mouse pointer to the right position on the motion chart and run up the letters to the one you want with Select. You can use and re-use the marked key frames in any order you like.

Asynchronous movement

Each object to be moved has its own line on the motion chart, so it is possible to create a fair degree of asynchronous movement, only the start and end positions being essentially aligned, and this can be masked by having objects stationary for different times at the start or end of the film.

The motion chart is not part of the object file so must be saved separately and then re-loaded if you want to do further work on the film at a later date. It's a pity that Ace was not able to make Mogul detect that a motion control file existed for a given object file and load it in automatically.

A point not made clear in the booklet, is that when creating a film Mogul only considers the object window currently displayed. This means you must return to the root object to record all the object parts, both moving and stationary.

Mogul can only generate films of around 10 seconds long using the default film speed of 25 frames per second, but it is possible to put films together for greater times, provided you have adequate disc space.

In a 1Mb machine memory is very tight. With Euclid, Mogul and Projector, there really isn't room for anything else and after a while you are likely to run out of memory, in which case Mogul will sulk and take itself off. With 2Mb I had no problems at all.

As with Euclid, you can see that Ace is still developing Mogul, and in the !Readme file refers to yet more extensions to come. Ace seems to be keen to keep all its software fully up to date, but I expect that some potential customers will find all the upgrades and extensions disquieting.

Having seen a number of the films that Ace has built up, it's possible to see the whole of Euclid in a quite different light, from an animated 3D artistic point of view instead of as a purely practical engineering demonstration aid.

Summing up

Considering that the disc also includes an improved version of the projector application, I think the Mogul extension is pretty good value for money. i particularly like the smooth way the applications work together. They are highly idiot-resistant, even when I deliberately set out to handle the applications "backwards".

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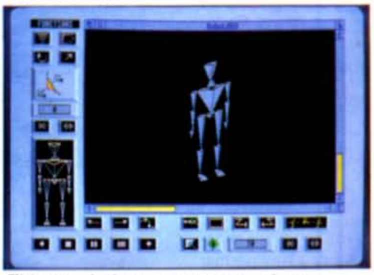

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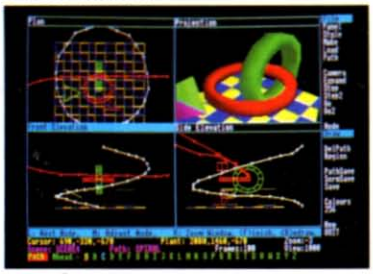

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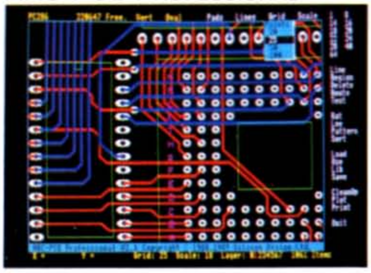

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WITH the unprecedented growth in online leisure services, playing multi-user adventure games via the telephone and a modem is fast becoming a national pastime, with players from all over the country logging on to enjoy what must be the ultimate in ego trips.

Many with a liking for this kind of relaxation have already dabbled in Shades while it was available on MicroLink. It provided hours of entertainment for both young and old and proved to be one of the most popular items provided by the service.

For those that missed it, the object was simple: Using compass directions you had to make your way round a fantasy land amassing points by collecting valuable treasure, while avoiding attackers in the form of other players' and mobiles — computer-generated characters.

As your points increased so did the level of your character and consequently its strength and power. Your ultimate aim was to reach the rank of Wizard.

My son David and I, using the characters The Great Skeeve and Arfabrain, made lots of friends — and a few enemies. Even though the game had its faults, restrictions and a few *undocumented features*, it was great entertainment.

Arfabrain and Skeeve now live on in Federation II and we look forward to meeting some of our old acquaintances who have not yet taken up the challenge.

BACK TO THE FUTURE

Alan McLachlan introduces an innovative, entertaining game that has recently joined the services provided by MicroLink

UNTIL its move to Istel, MicroLink catered for real-time online leisure only with the multi-user fantasy Shades. This proved immensely popular since its introduction to the system in September 1988, but it has now been outgrown by Federation II, which MicroLink has taken on board.

To describe Federation II as a merely a game is a bit of an understatement. It is in fact a massive interplanetary space trading simulation that will cater for the needs of a variety of users be they 9 or 90, nasty or nice, warrior or wimp, and is the brainchild of games designer Alan Lenton.

It's big with a capital B: The scenario is the universe with all its planets and there are more than 900 locations to explore. Your main aim is to amass a larger fortune than any other player, by fair means or foul, to progress through the ranks from Groundhog to Emperor.

However, the imperial groats aren't just lying around waiting to be picked up — they have to be earned. And just as in real life you amass your wealth in a variety of ways depending on your own skills and temperament. Social activity, economic and political interaction, and even all-out interplanetary war, all have their part to play in your rise to the top.

Your first priority is to stay alive, and to do this you'll need to keep up your stamina by eating and drinking. To get the money for this, finding a job is imperative — first by carrying other people's goods from one planet to another. Hopefully, later you'll be carrying and trading in your own goods, and ultimately setting up your own business and employing others to do the donkey work while you prosper on the proceeds.

You've only one life

The game only allows you one character on your personal ID and the first time you log on you allocate its vital statistics. There are 140 points to distribute between strength, stamina, intelligence and dexterity.

Each of these attributes is important for a different reason: Strength limits the number of objects you can carry, stamina determines your state of health, intelligence the level of computer you can use. Dexterity is important in close combat, and you only have one life. Get yourself killed and that's it. There's no logging back on as in Shades, reduced in rank to start all over again.

However, once you have a character that starts to make progress you can take out life insurance which means that should you meet an untimely end you'll simply wake up in hospi-

➤

tal back on Earth surrounded by get well cards. The only problem is that life insurance costs money — another reason for finding work.

Starting off on Earth you must buy clothes and write a description of how you are attired. This will stay with you until you decide to change it. You move around as normal using compass directions and this will involve visiting any one of six planets. But because even Chez Deisel's, the social centre of the solar system, is on Mars, you'll need transport. That means acquiring a spaceship.

You can have a vessel made to your own specifications and kitted out with a range of weapons that would put the Enterprise to shame. But you'll have to pay for it, and the cheapest will cost you an arm and a leg.

Just as in real life, the money has to be taken out as a loan and repaid by regular instalments. And owners of spaceships also have to budget for servicing and repairs which will be the inevitable outcome of regular use.

At the social centres you can make friends, chat, form or destroy alliances, even take part in the occasional orgy. All these will stand you in good stead for the later political stages of the game, when popular support will be vital.

It is at Chez Deisel's, and in other similar establishments, that you can buy food or drink to top up your stamina. Buying a round has been known to be very effective in promoting an individual's popularity: It boosts everyone else's stamina, but does to tend to drain the bank balance rather rapidly.

Federation II is more than a game, it's a broad ranging test of skill which is fun to play and is a superb simulation which could even be used as a searching test for the abilities of business executives.

● *Arfabrain and The Great Skeeve will be providing a series of regular hints and tips in these pages. So even if you've never tried anything like this before, give it a whirl — you'll find you've been missing out on one of the most entertaining ways of using your*

> *‘ Buying a round has been known to be very effective in promoting popularity ’*

What you'll need...

If this introduction to Federation II has whetted your appetite to enjoy living other lives during your leisure time, in addition to your micro, the following is all you'll need to be up and running:

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```
1210  PHA:TXA:JMP notz
1220 .pdec:LDA #10:BNE pnum
1230 .phex:LDA #16
1240 .pnum:STX LoNum:STY HiNum
1250  STA NmBase:LDA #4:STA FldSize
1260  LDA #255:STA zflg
1270 .nbit:PHA:LDA #0:STA LoWork
1280  STA HiWrk:LDX #16
1290 .next:ASL LoNum:ROL HiNum
1300  ROL LoWork:ROL HiWrk:LDA LoWork
1310  SEC:SBC NmBase:TAY:LDA HiWrk
1320  SBC #0:BCC done:INC LoNum
1330  STY LoWork:STA HiWrk
1340 .done:DEX:BNE next:LDA LoWork
1350  DEC FldSize:BNE nbit
1360 .out:TAX:BNE notz:PLA:PHA:PHP
1370  TXA:PLP:BMI notz:BIT zflg
1380  BPL notz:LDA #spc:BNE digout
1390 .notz:LDX #0:STX zflg:CMP #10
1400  BCC add:ADC #6
1410 .add:ADC #48
1420 .digout:JSR wrch:PLA:BPL out
1430 .exit:RTS
1440 ]:NEXT:ENDPROC
1450 DEF PROCcli($&700):LOCALX%,Y%
```

```
  10 REM >$.Check/Src
  20 REM by Paul Dellar
  30 REM (c) The Micro User
  40 DIM code% &1000
  50 PROCassemble
  60 OSCLI("SAVE Check "+STR$~code%+" "
+STR$~O%)
  70 OSCLI("SETTYPE Check FFC"):END
  90 :
 100 DEF PROCassemble
 110 work_crc = 0:char      = 1
 120 loop     = 2:mask      = 3
 130 flags    = 4:total_crc= 5
 140 line_crc = 6:start     = 8
 150 end      = 9:line_len =10
 160 line_num =11:prog_ptr =12
 170 sp       =13:link     =14
 180 WriteI   =&100
 190 rem_token=&F4:data_token=&DC
 200 quoteflag=1<<30
 210 comntflag=1<<29
 220 data_flag=1<<28
 230 fieldlen =5:maxlen   =8
 240 FOR pass%=4 TO 7 STEP 2
 250 P%=0:O%=code%:[OPT pass%
 260 .checksum
 270       STMFD (sp)!,{link}
 280       MOV   prog_ptr,#&8F00
 290       MOV   total_crc,#0
 300       MOV   flags,#0
 310 .for_each_line
 320       SWI   "OS_ReadEscapeState"
 330       BCS   exit
 340       BIC   flags,flags,#data_flag
 350       BIC   flags,flags,#comntflag
 360       BIC   flags,flags,#quoteflag
 370       LDRB  char,[prog_ptr,#1]
 380       CMP   char,#&7F
 390       BGT   exit
 400       MOV   line_crc,#0
 410       LDRB  char,[prog_ptr]
 420       CMP   char,#&0D
 430       BNE   bad_prog
 440       LDRB  line_num,[prog_ptr,#1]
 450       MOV   line_num,line_num,LSL#
8
 460       LDRB  char,[prog_ptr,#2]
 470       ADD   line_num,line_num,char
 480       LDRB  line_len,[prog_ptr,#3]
 490       MOV   start,#4
 500       MOV   end,line_len
 510 .trailing_spaces
 520       CMP   end,start
 530       BEQ   leading_spaces
 540       LDRB  char,[prog_ptr,end]
 550       CMP   char,#ASC" "
 560       SUBEQ end,end,#1
 570       BEQ   trailing_spaces
 580 .leading_spaces
 590       CMP   start,end
 600       BEQ   check_loop
 610       LDRB  char,[prog_ptr,start]
 620       CMP   char,#ASC" "
 630       ADDEQ start,start,#1
 640       BEQ   leading_spaces
 650 .check_loop
 660       LDRB  char,[prog_ptr,start]
 670       CMP   char,#rem_token
 680       BEQ   no_crc
 690       CMP   char,#data_token
 700       ORREQ flags,flags,#data_flag
 710       TST   flags,#data_flag
 720       BNE   no_further_checks
 730       CMP   char,#ASC(":")
 740       BICEQ flags,flags,#comntflag
 750       TST   flags,#comntflag
 760       BNE   next_byte
 770       CMP   char,#ASC("""")
 780       EOREQ flags,flags,#quoteflag
 790       TST   flags,#quoteflag
 800       BNE   no_further_checks
 810       CMP   char,#ASC("[")
 820       ADDEQ flags,flags,#1
 830       ANDS  flags,flags,#255
 840       BEQ   no_further_checks
 850       CMP   char,#ASC("\")
 860       ORREQ flags,flags,#comntflag
 870       TST   flags,#comntflag
 880       BNE   next_byte
 890       CMP   char,#ASC("]")
 900       SUBEQ flags,flags,#1
 910 .no_further_checks
 920       MOV   work_crc,line_crc
 930       BL    crc_code
 940       MOV   line_crc,work_crc
 950       MOV   work_crc,total_crc
 960       BL    crc_code
 970       MOV   total_crc,work_crc
 980 .next_byte
 990       ADD   start,start,#1
1000       CMP   start,end
1010       BLT   check_loop
1020 .no_crc
1030       MOV   R0,#ASC(" ")
1040       MOV   loop,#8
1050       ADR   R1,print_buff
1060 .clear_lp
1070       STRB  R0,[R1,loop]
1080       SUBS  loop,loop,#1
1090       BGT   clear_lp
1100       MOV   R0,line_num
1110       MOV   R2,#maxlen
1120       SWI   "OS_BinaryToDecimal"
1130       MOV   R0,R1
1140       MOV   R1,R2
1150       RSBS  R3,R1,#fieldlen
1160       BLNE  printSpaces
1170       SWI   "OS_WriteN"
1180       SWI   WriteI+ASC(" ")
1190       SWI   WriteI+ASC("=")
1200       SWI   WriteI+ASC(" ")
1210       MOV   R0,line_crc
1220       ADR   R1,print_buff
1230       MOV   R2,#maxlen
1240       SWI   "OS_ConvertHex4"
1250       MOV   R1,#4
1260       BL    leadingSpaces
1270       SWI   "OS_WriteN"
1280       SWI   WriteI+ASC(" ")
1290       MOV   R0,total_crc
1300       ADR   R1,print_buff
1310       MOV   R2,#maxlen
1320       SWI   "OS_ConvertHex1"
1330       MOV   R1,#1
1340       SWI   "OS_WriteN"
1350       CMP   end,line_len
1360       SWINE WriteI+ASC("*")
1370       SWI   "OS_NewLine"
1380       ADD   prog_ptr,prog_ptr,line
_len
1390       LDRB  char,[prog_ptr,#1]
1400       CMP   char,#&7F
1410       BLE   for_each_line
1420 .exit
1430       LDMFD (sp)!,{pc}
1440 .bad_prog
1450       SWI   "OS_WriteS"
1460       EQUS  "Bad Program"
1470       EQUW  13
1480       ALIGN
1490       LDMFD (sp)!,{pc}
1500 .crc_code
1510       MOV   mask,#&FF
1520       ADD   mask,mask,#&FF00
1530       EOR   work_crc,work_crc,char
,LSL#8
1540       MOV   loop,#7
1550 .crc_loop
1560       TST   work_crc,#1<<15
1570       EORNE work_crc,work_crc,#&81
0
1580       MOV   work_crc,work_crc,LSL
#1
1590       ADDNE work_crc,work_crc,#1
1600       AND   work_crc,work_crc,mask
1610       SUBS  loop,loop,#1
1620       BPL   crc_loop
1630       MOV   pc,link
1640 .printSpaces
1650       STMFD (sp)!,{R0-R2,link}
1660       ADR   R0,spaces
1670       MOV   R1,R3
1680       SWI   "OS_WriteN"
1690       LDMFD (sp)!,{R0-R2,pc}
1700 .leadingSpaces
1710       STMFD (sp)!,{R0-R2,link}
1720       MOV   R1,#0
1730 .spacesLoop
1740       LDRB  R2,[R0,R1]
1750       CMP   R2,#ASC("0")
1760       BNE   spacesExit
1770       MOVEQ R2,#32
1780       STREQB R2,[R0,R1]
1790       ADD   R1,R1,#1
1800       CMP   R1,#3
1810       BNE   spacesLoop
1820 .spacesExit
1830       LDMFD (sp)!,{R0-R2,pc}
1840 .print_buff
1850       EQUS  STRING$(maxlen," ")
1860 .spaces
1870       EQUS  STRING$(fieldlen," ")
1880 ]:NEXT:ENDPROC
```

Listing II: Checksums for the Archimedes series

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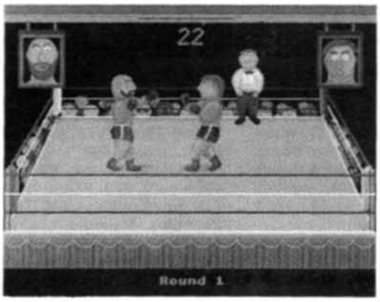

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- Archimedes original games & software. Bargain price. Telephone 0706 817570 for details.
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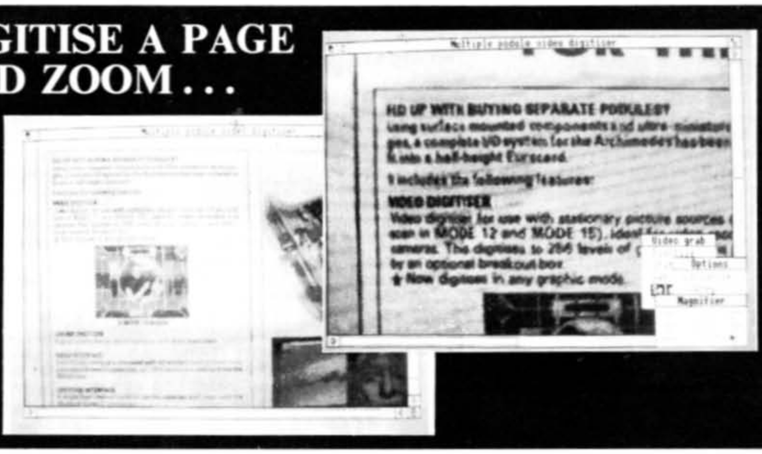

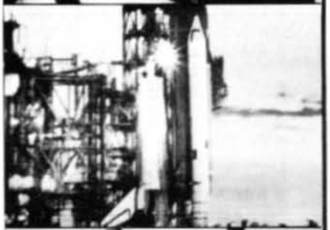

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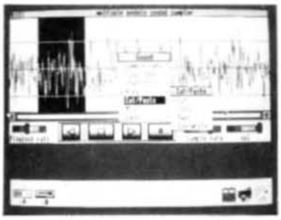

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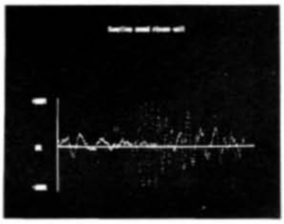

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Risc OS compatible Wimp program

MY series of articles – from January 1989 to September 1989 – on using the Wimp system of the Archimedes was written using good old Arthur, the original operating system. I was quite proud of the program and used it often to keep my accounts.

You can imagine my horror when I recently upgraded to Risc OS and found that the program didn't work any more. I kept getting the message Address exception *at quite incredible hexadecimal numbers.*

I eventually discovered the solution to the problem buried deep within the pages of the Progammers' Reference Manual. Line 1500, which reads at present:

```
1500$tb%=LEFT$(t$,g%-1):
ptr%!12=tb%:tb%+=24
```

should be altered to read:

```
1500$tb%=LEFT$(t$,g%-1):
ptr!12=tb%:ptr%!16=-1:pt
r!20=LEN$tb%:tb%+=24
```

The second problem is due to the fact that Risc OS allows more windows than Arthur did. FNwhich needs to be altered to match, so the number 960 should be altered to 1760.

I hope that the failure of the program to work with Risc OS hasn't caused any discouragement. Simple programming is worth the effort, particularly with the new multi-tasking facilities available under the new operating system. – **Kendall Down, Meliden, Clwyd.**

Mistake gets highlighted

THANK you very much for printing my letter in the September 1989 edition of The MicroUser. *Unfortunately an extra highlight was shown and the number of spaces wasn't clear.*

The correct instruction is shown below. Note that after the first full stop there are two spaces and four after the U:

```
Bl*3a*-*-*D.  .*U    *4tter
```

– **S. A. McCoy, Wollaton, Nottingham.**

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This way to the bar

AFTER reading your November 1989 issue of The Micro User *we tried to type in the utility program LaBelle but when we came to line 320, which starts *KEY0, we came across a vertical straight line which we cannot seem to find on the keyboard. Please can you help us?* – **Ben Mahoney and Andrew Kettleby, Stanford-le-Hope, Essex.**

● *The vertical line is the* bar. *This is the shifted \ and is just below and to the right of Break.*

Ringing the changes

George Speller's program LaBelle in the November 1989 issue was just the kind of listing that makes us BBC Micro addicts look forward to the next edition of The Micro User. *I now use the program regularly to print out various types of label.*

It also allows scope for expansion: I have added five new items to the Main Menu, but I will describe just one here – a toggle procedure for altering between double and single strike mode printing. Also, the new lines 152 to 158 and line 702 simply switch the cursor on and off, giving a better appearance of the display and a much neater QUIT than the original.

The changes to the program are minimal with some lines being altered slightly and a few lines being added.

Change the following lines:

```
150 UNTIL M%=6
580 DIM options$(10)
590 DATA Set up, Filing, E
dit label, Print label, To
g, Strike, Quit
600 FOR N%=1 TO 6
740 FOR N%=1 TO 6
820 IF G%=138 line%=line%-
(line%<6)
850 IF M%<7 AND M%>0 line%
=M%:select%=TRUE
2930 PROCpcode(D%,0)
And add:
142 IF M%=5 PROCstriketogg
le
152 *FX4,0
154 VDU26
156 VDU 23,1,1;0;0;0;
158 CLS
412 D%=71:code$="Doub."
702 VDU 23,1,0;0;0;0;
932 IF N%=5 GOTO 942
942 IF N%=5 PRINTTAB(10,N%
)CHR$newcol%;CHR$back%;CHR
$col%;N%;" ";option$(N%);T
AB(27,N%);CHR$156;CHR$newc
ol%;CHR$back%;CHRcol%;code
$;SPC(1);CHR$156
4200 DEFPROCstriketoggle
4210 IF D%=71 D%=72:code$=
"Sing.":ELSE D%=71:code$="
Doub."
4220 ENDPROC
```

– **Frank Chaplin, Withnell, Chorley, Lancs.**

A better class of beep

Most BBC Micro owners will agree that the standard beep caused by statement like VDU 7, Copy and Control+G is pretty boring and sometimes extremely annoying, especially when you consider the micro's high quality sound generator.

But you can replace the standard sound with almost any sound you wish using a few FX commands:

*FX 211,c	Sound channel
*FX 212,v	Envelope/ volume level
*FX 213,p	Pitch
*FX 214,n	Duration

The sound channel, pitch and duration are all entered as normal. Calculating the v value is a bit more complex – if you want an envelope number just subtract one and multiply by eight. To set a volume (usually 0 to -15) use 256 plus volume times eight. Two good examples are a pleasant ping:

```
ENVELOPE1,1,0,0,0,0,0,0,-
126,
-2,0,-1,126,80
*FX 211, 1
*FX 212, 0
*FX 213, 180
*FX 214, 1
```

And a mysterious sound that you will either love or hate:

```
ENVELOPE1,1,-26,-36,-45,255
255,255,127,0,0,-127,126,0
*FX 211,1
*FX 212,0
*FX 213,100
*FX 214,150
```

– **Matthew Bennion, Royton, Oldham.**

Micro User fact file

A FEW years ago I bought the bibliography disc of The Micro User. *Whenever I needed a fact I could use the program quickly to locate various issues of where help may be found. Is an up-to-date bibliography available?* – **Nick Moran, Stockport, Cheshire.**

● Unfortunately the bibli-

➤

➤

ography has not been updated recently. If any reader has an up-to-date one – or would like to help prepare one – please contact us.

Teletext for the Archimedes

IN your December issue you stated that there was no teletext adaptor for the Archimedes or A3000. Well there is now. It has exactly the same specification as the 8 bit BBC Micro one, but it needs an I/O podule to function.

The complete package (not podule) is just £143.75. We can also supply the necessary upgrade for people who bought an adaptor for the 8 bit BBC Micro and now want to use it with the Archimedes series. – **Ray Hope, Morley Electronics, Morley House, off Norham Road, North Shields, Tyne & Wear NE29 7TY.**

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Trapping Break

PLEASE can you help me by explaining how to make any kind of Break re-run a program and how to disable the Break key totally on my BBC Model B.

Also readers may be interested to know a simple way to control the LED lights on the keyboard and also the input mode which they reflect (for example Caps Lock mode). The commands following switch the mode:

?&25A=&10 selects Shift Lock

?&25A=&20 selects Caps Lock

?&25A=&30 switches both Locks off

– J. Smith, Oadby, Leices.

● You can intercept Break quite easily to make a program re-run itself by using the small piece of machine code following. It uses the *FX commands 247, 248 and 249 to point the vector issued on Break to the code which inserts OLD|MRUN|M into the keyboard buffer.

```
 10 REM Break Intercept
 20 REM (c) The Micro User
 30 MODE 7
 40 FOR pass=0 TO 3 STEP 3
 50 P%=&900
 60 [OPT pass
 70 BCC out
 80 LDX #rerun MOD 256
 90 LDY #rerun DIV 256
100 JSR &FFF7
110 .out
120 RTS
130 .rerun
140 EQUS "KEY10 OLD|MRUN|M"
150 EQUB 13
160 ]:NEXT
170 *FX 247,76
180 *FX 248,0
190 *FX 249,9
```

You cannot actually disable the Break key from software – the only hardware solution is to break off its links with the circuit board, but this is a bit drastic. All you can do is to make the Break key clear all memory between &400 and &8000 when it is pressed.

This function is performed by the *FX 200 command followed by a number 0,1,2 or

£10 Prize letter

First line feature

WHILE using different program start line numbers recently on my Master 128 I noticed a quite unique feature of BBC Basic – the first line number sometimes changes when Break is pressed. It only occurs if the line number of the first program line is greater than 255. The reason is as follows:

*When Basic is reset on Break, *BASIC or the NEW command the first two bytes at PAGE store the codes for TOP, so that Basic can locate the end of used memory. As Basic believes that there is no program there 13 and 255 are stored at PAGE and PAGE+1.*

When you then type OLD, PAGE+1 is reset to 0 and the rest of memory is restored to the arrangement it had beforehand. Basic then resets TOP to its 'true' value.

The line number changes because of this zero byte at PAGE+1. When Basic stores a program line the first location of memory (PAGE) is set to 13. PAGE+1 and PAGE+2 are set to the high byte and low byte of the first line number respectively.

Because location PAGE+1 had been reset to the default zero, the first line number has a blank high byte, meaning that it cannot be higher than 255. Therefore any first line number above 255 will be altered.

This can be seen by the following:

```
258 REM This is the first
line
```

will turn out to be:

```
2 REM This is the first line
```

Now enter Program I and run it. You should get The Micro User *repeatedly displayed. Then press Break and type OLD and RUN. You will undoubtedly get one printout of* The Micro User *followed by a blank line and the message* No such line at line 1040.

```
1000 REM Program I
1010 REM by S.P.Wade
1020 PRINT "The Micro User"
1030 GOTO 1000
```

If you then LIST the program you will find that there is no line 1000 – it has been changed to 232. But if you look at line 1030 it still says GOTO 1000, *proving that the effect is not caused by a type of RENUMBER command.*

This happens on all types of Acorn micros which contain BBC Basic, including the Archimedes. The table above shows the difference between the arrangement of memory before and after pressing Break.

The moral of this tale is do not choose a line number that is greater than 255 as your first line. Make it a more sensible figure such as 10 or 100 – **Stephen Wade, Stockport, Cheshire.**

Memory Address	Before Break	After Break	Byte meaning
PAGE	*13*	*13*	*Return character*
PAGE+1	*3*	*0*	*Line high byte*
PAGE+2	*232*	*232*	*Line low byte*
PAGE+3	*15*	*15*	*Line length*
PAGE+4	*244*	*244*	*REM token*
PAGE+5	*32*	*32*	*Space character*

3. The effects of each of these are:

***FX 200,0:** Enable Escape and Break.
***FX 200,1:** Disable Escape only.
***FX 200,2:** Clear memory on Break only.
***FX 200,3:** Disable Escape and on Break clear memory.

Diphthong vs ligature

AT the risk of being called a pedant – OK, I'm a pedant – combinations of letters like AE and OE are not diphthongs, as stated in the review of Desktop Publisher – November 1989 – they are ligatures:

A diphthong is a compound vowel sound produced by combining two simple ones like ou in loud.

Keep up the good work. – **John Purser, Cheshunt, Herts.**

● *You're quite right. We certainly got our ligatures in a twist there.*

Saving made even easier

In the November 1989 issue there were some really easy ways to save programs. It is simpler still to dispense with the machine code file altogether and to start your program – in this case called TITLE in directory B – with the following two lines:

```
  10 REM>B.TITLE
  20 *KEY0 SA.$(PAGE+6)|M
```

RUNning the program then defines the soft key. Addition of a further line facilitates editing in the usual way by re-defining the Break key:

```
30*KEY 10 OLD|MMODE 7|MLIST|M
```

Thus f0 will save your program, and Break will list it in paged mode in Mode 7. How lazy can you get? – **John R. Williams, Birkenhead, Merseyside.**

Speed up those fractals

I FOUND the fractal program by Mike Cook in the July 1989 issue of The Micro User *fun to play with, but the fractals I wished to examine always needed to be drawn three times before they fitted on to the screen. I then wondered if it was possible to draw them right the second time, seeing as the program already knew the values of min and max for both X and Y.*

To do this I rewrote PROC_SF:

```
 1050 DEFPROC_SF
 1055 LOCAL Cx,Cy
 1060 Cx=1280/(MaxX-MinY)*0
.99
 1065 Cy=1024/(MaxY-MaxY)*0
.99
 1070 SFx=SFx*Cx
 1075 SFy=SFy*Cy
 1080 SX=INT((SX-MinX)*Cx)
 1090 SY=INT((SY-MinY)*Cy)
 1095 IF SFxXXXSFy
THEN SFy=SFx ELSE SFx=SFy
 1100 ENDPROC
```

Line 1095 keeps the aspect ratio to 1, it can be deleted to fit a full screen. In line 1230 you should delete the part:

```
:SFx=0.1:SFy=0.1
```

The following lines should be entered as shown to complete the changes:

```
  60 SFx=1280/32
  70 SFy=1024/32
 660 X=X+SIN(V)*SFx
 670 Y=Y+COS(V)*SFy
```

With all these alterations made the program will draw a screen-filling fractal the second time around. If your fractal is going off the screen when being drawn, hit the spacebar and the program will redraw it, and this time it should fit better.

Also the procedure PROC_CURVE can be adjusted a little bit. Insert the following line:

```
 355 B%=LEN(A%$)+1
```

Delete lines 440 to 480 and then edit the lines below:

```
 430 IF E%>MX% OR RD%=RL% T
HEN PROC_TURTLE(C$) ELSE PR
OC_CURVE(R$(1,E%),RL%+1)
 500 IF A%XXXB% THEN 370
```

In the above, the call for PROC_CURVE in line 430 substitutes the loop in lines 440 to 480. The ever-flashing cursor on the graphics screen can be switched on and off with the next two lines:

```
 270 VDU 23,1,0;0;0;0;
 295 VDU 23,1,1;0;0;0;
```

– **Mario Veraart, AE Tollebeek, Netherlands.**

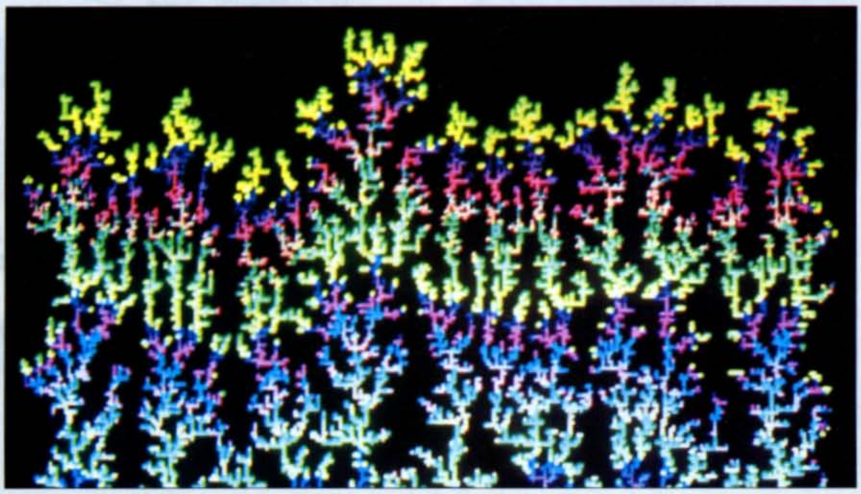
Faster fractal ferns

THE listing of diffusion limited aggregation printed in the August 1989 issue of The Micro User *takes forever to generate fractals on an 8 bit BBC Micro – as predicted.*

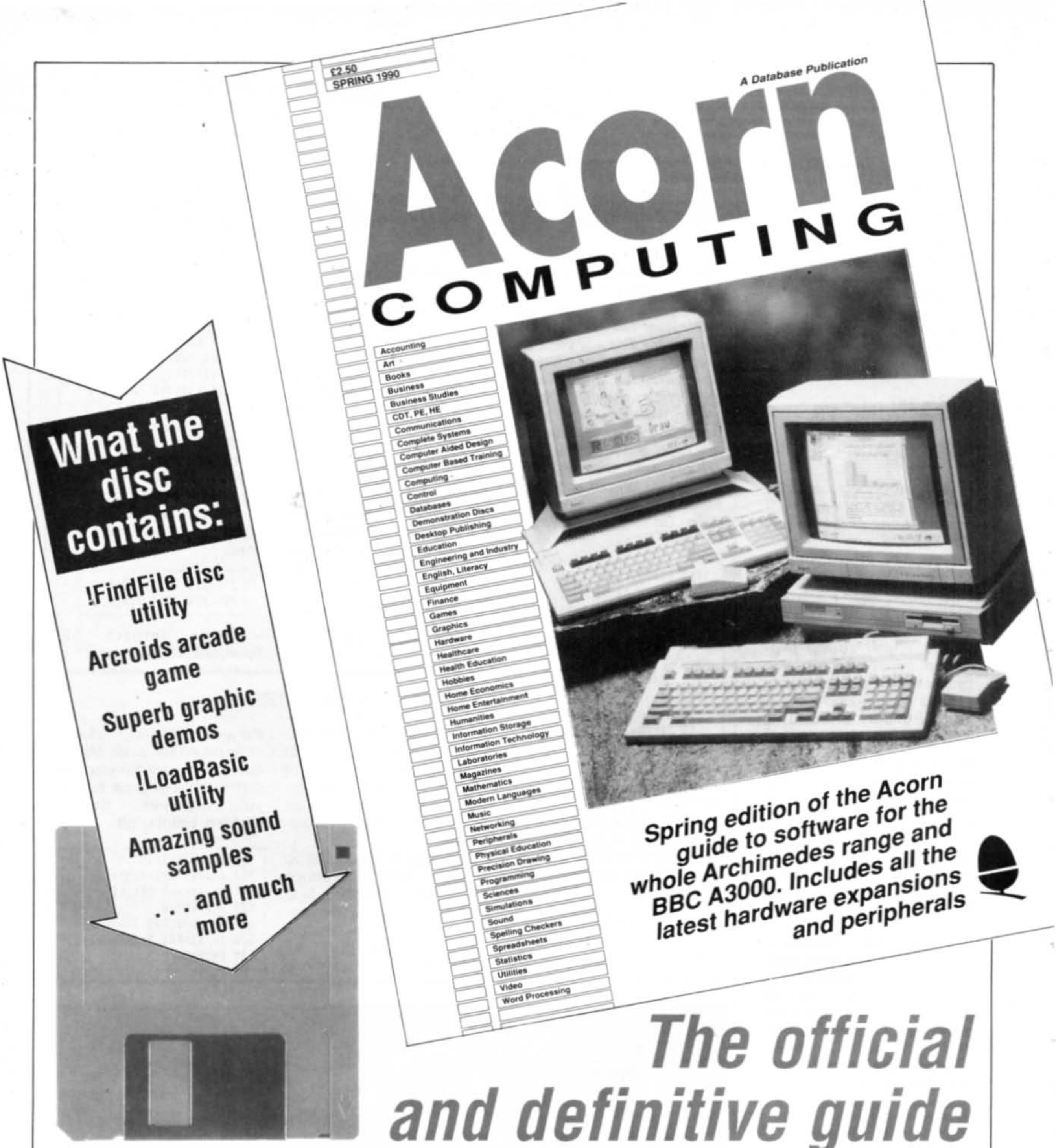
One way to speed this up however, and still produce the fractal as intended, is to limit the range of the random X% value generated.

This can be done by ensuring that it is kept within the width of the fern – plus a little bit either side. Using the changes shown you can watch the fern grow before your very eyes. – **Sandy McAfee, Edinburgh.**

```
 105 XL%=625:XR%=655
 250 X%=RND(XR%-XL%)+XL%
 385 IF T%<>-1 PROCLR
 550 DEFPROCLR
 560 IF X%<XL%+5 XL%=XL%-5
 570 IF X%>XR%-5 XR%=XR%+5
 580 ENDPROC
```



Fractals by diffusion aggregation



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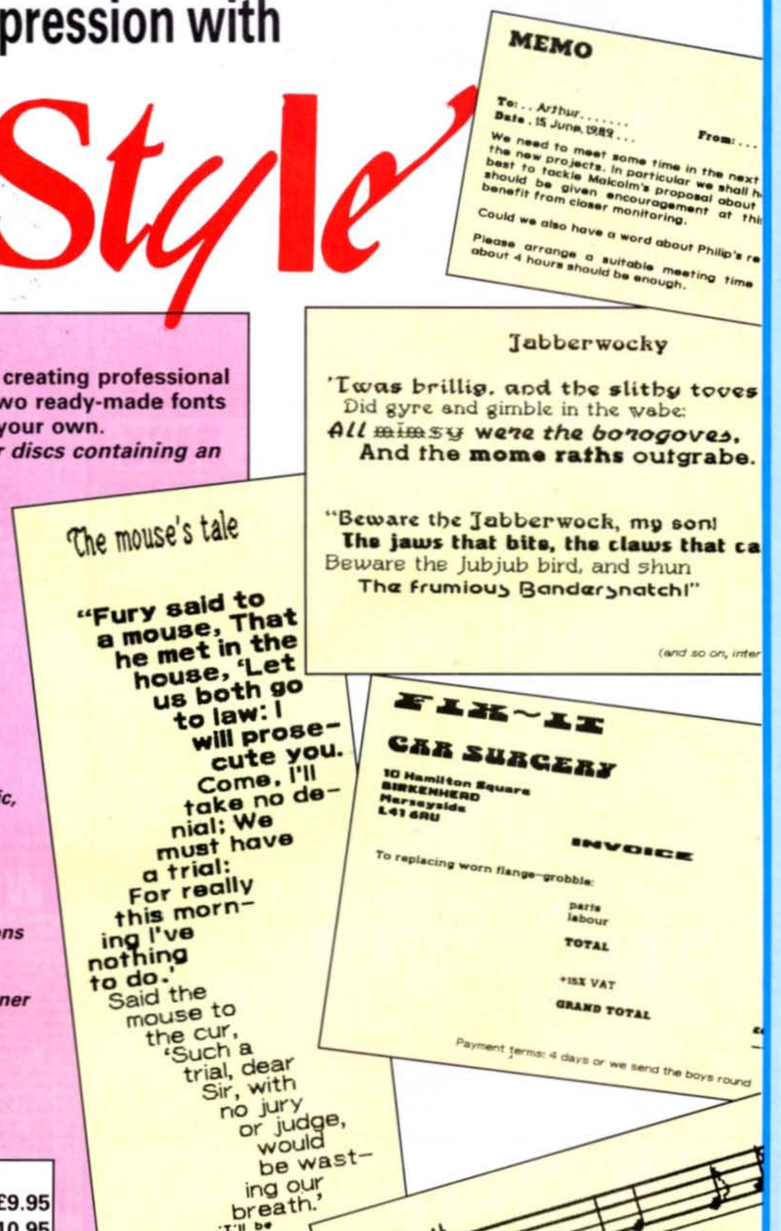

MEMO

To: ..Arthur.......
Date . 15 June 1989 ...
From: ...

We need to meet some time in the next the new projects. In particular we shall h best to tackle Malcolm's proposal about should be given encouragement at thi benefit from closer monitoring.

Could we also have a word about Philip's re

Please arrange a suitable meeting time about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the **mome raths** outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

(and so on, inter

The mouse's tale

**"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial; We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'**
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'
'I'll be
judge,
I'll be
jury,'
Said
cun-
ning
old
Fury:
'I'll
try
the
whole
cause,
and
con-
demn
[illegible]
[illegible]'

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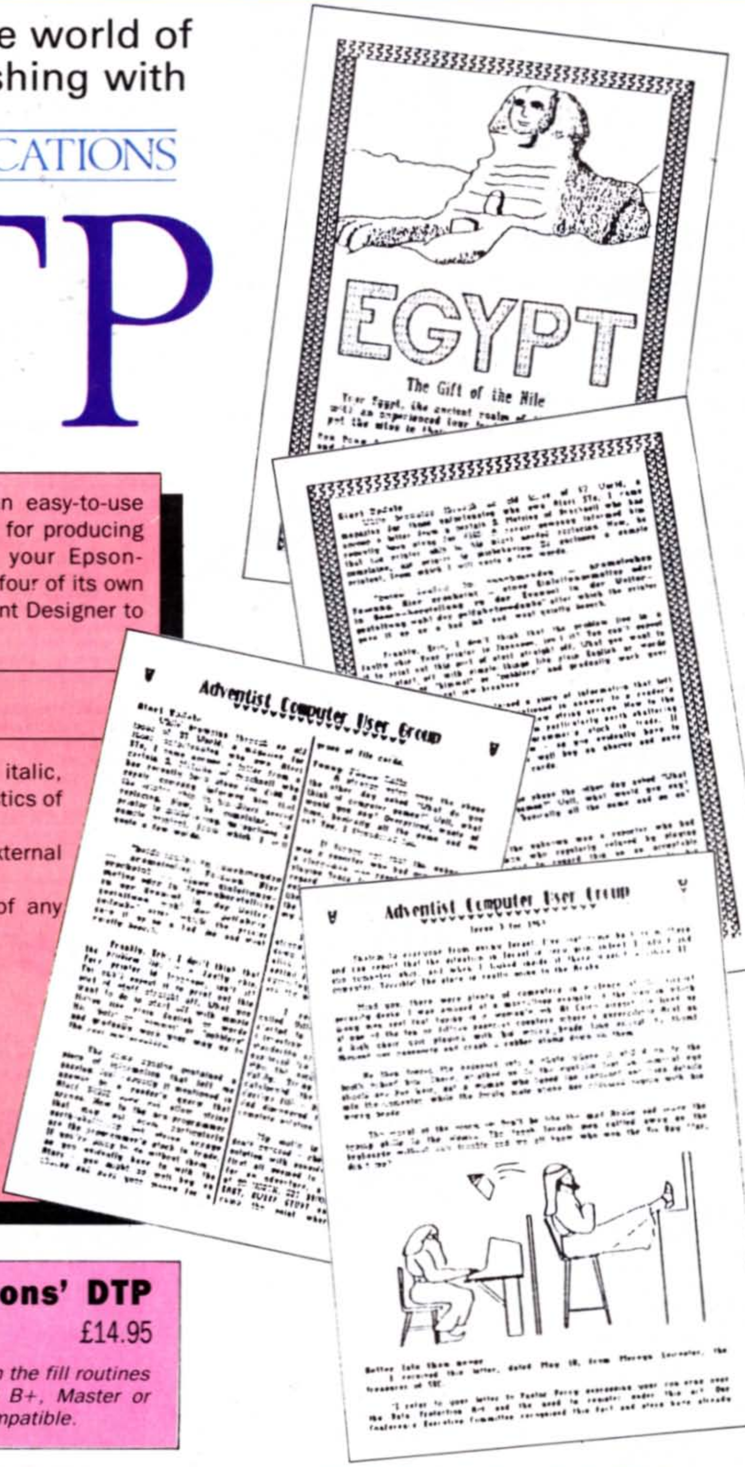

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(see page 116)

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(see page 118)

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(See page 117)

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MU2

◄ From Page 19

Listing I

```
   10 REM Golf Game
   20 REM by Jon Perry and Pali Rao
   30 REM (c) The Micro User
   40 PROCx(&1300)
   50 ONERROR MODE7:REPORT:PRINT" at lin
e ";ERL:END:MODE7:PROCe
   60 MODE2:VDU23,1,0;0;0;0;:*FX11
   70 PROCi:PROCc
   80 PROCh:MODE7:PROCf
   90 CLEAR:RUN
  100 DEFPROCf
  110 FORd=0TO1
  120 PRINTTAB(10,1+d)CHR$141CHR$130"Gol
f ScoreCard"
  130 PRINTTAB(0,5+d)CHR$141CHR$134"Numb
er of shots :"CHR$132;sh
  140 PRINTTAB(3,8+d)CHR$141CHR$134"Par
for "S$" :"CHR$132;P%
  150 PRINTTAB(0,12+d)CHR$141CHR$129"Ano
ther game ? (Y/N)":NEXT:*FX15,0
  160 REPEAT:A$=GET$
  170 Z%=INSTR("YyNn",A$)
  180 UNTILZ%>0
  190 IFZ%<3 ENDPROC
  200 END
  210 DEFPROCi
  220 DIMa(14),l(14):G=0:xb=0:yb=0:x=64:
y=0:oxb=0:oyb=0:P=0:OP=0:OW=1:W=1:sh=0:S
M=100:gc=5:WH=0:P%=0
  230 FORR=1TO14:READa(R),l(R):a(R)=RAD(
a(R)):NEXT
  240 DATA22,185,25,171,29,158,33,144,37
,131,41,117,45,104,49,90,55,81,0,0,11,24
8,16,225,18,216,21,203
  250 VDU23,224,0,0,99,99,127,127,99,99,
23,225,0,0,0,127,96,127,3,127,23,226,0,8
,28,62,127,28,28,28,23,227,16,24,252,254
,252,24,16,0
  260 VDU23,228,28,28,28,127,62,28,8,0,2
3,229,0,16,48,126,254,126,48,16,23,230,6
0,126,255,255,255,255,126,60,23,231,0,0,
24,60,60,24,0,0
  270 VDU23,232,0,12,30,30,62,62,28,0
  280 ENDPROC
  290 DEFPROCc:Z%=0
  300 COLOUR1:PRINTTAB(8,1)"GOLF"
  310 COLOUR2:PRINTTAB(0,4)"H:Hole  C:Co
urse"
  320 REPEAT:A$=GET$
  330 Z%=INSTR("HhCc",A$)
  340 UNTILZ%>0
  350 IFZ%<3 S$="hole":ML=7 ELSE S$="cou
rse":ML=6:Z%=10
  360 CLS:PRINTTAB(0,3);"Enter name of "
;S$
  370 PROCj(6,6):ENDPROC
  380 DEFPROCh:*FX12,5
  390 *FX11,10
  400 *FX4,1
  410 REPEAT:f=0:CLG
  420 IFZ%<3 PROCl(N$) ELSE n$=N$+STR$(Z
%-9):PROCl(n$):Z%=Z%+1
  430 GCOL0,1:X=TX:Y=TY:OX=X:OY=Y:PLOT69
,HX,HY
  440 PROCo
  450 REPEAT
  460 PROCt:PROCp:PROCm:PROCa
  470 IFP=6 PROCg
  480 UNTIL (Z%<3 OR Z%>9) AND f=1
  490 P%=P%+p
  500 UNTILZ%<3 OR Z%=19
  510 ENDPROC
  520 DEFPROCj(Q,W)
  530 PRINTTAB(Q,W);:N$="1234567":N$="":
REPEAT
  540 A=GET:IFA=13 GOTO580
  550 IFA=127 AND N$>"" N$=LEFT$(N$,LEN(
N$)-1):PRINTCHR$(A);
  560 IFA<48 OR A>90 GOTO540
  570 IFLEN(N$)<ML N$=N$+CHR$(A):PRINTCH
R$(A);:ELSE SOUND1,-10,100,2
  580 UNTIL A=13
  590 ENDPROC
  600 DEFPROCl(T$)
  610 OSCLI("LOAD "+T$+" 468E")
  620 T$="@."+T$
  630 ch=OPENIN(T$)
  640 INPUT#ch,yd,p,GR,HX,HY,TX,TY
  650 CLOSE#ch
  660 ENDPROC
  670 DEFPROCo
  680 PROCb(1,32,736,1248,1012)
  690 PROCb(1,160,924,1120,1004)
  700 COLOUR6:PRINTTAB(3,1)"3456789PS":C
OLOUR5:PRINTTAB(13,1)"D345"
  710 GCOL0,0:MOVE176,736:DRAW1104,736
  720 PROCb(1,168,724,1112,780)
  730 COLOUR7:PRINTTAB(3,8);"Par:   Yds:
";TAB(6,4);"Shots:";:COLOUR3:PRINT;sh;TA
B(7,8);p;TAB(14,8);yd
  740 GCOL3,gc:MOVETX,TY:DRAWTX+x,TY
  750 ENDPROC
  760 DEFPROCt
  770 VDU24,48;744;144;1004;:GCOL0,128:C
LG:VDU24,1136;744;1232;1004;:GCOL0,128:C
LG:VDU26
  780 PROCb(4,48,744,144,1004):PROCb(4,1
136,744,1232,1004)
  790 FORI=760TO988STEP114:MOVE56,I:DRAW
136,I:MOVE1144,I:DRAW1224,I:NEXT
  800 COLOUR5:PRINTTAB(1,2)CHR$224TAB(1,
6)CHR$225TAB(18,2)CHR$228TAB(18,6)CHR$22
6:COLOUR7
  810 ENDPROC
  820 DEFPROCb(CL,x1,y1,x2,y2)
  830 GCOL0,CL:MOVEx1,y1:DRAWx1,y2:DRAWx
2,y2:DRAWx2,y1:DRAWx1,y1
  840 ENDPROC
  850 DEFPROCp
  860 ox=x:oy=y:GCOL3,gc:COLOUR3
  870 REPEAT:*FX15
  880 IFP=3 W=9:PRINTTAB(OW+2,2);" "
  890 ox=x:oy=y
  900 PRINTTAB(W+2,2);"^":A=GET
  910 IFA=90:IFx>-64 x=x-4
  920 IFA=88:IF<X64 x=x+4
  930 IFA=58:IFy<64 y=y+4
  940 IFA=47:IF>Y-64 y=y-4
  950 IFA=137:IFW<14:W=W+1:IFW=10 W=11
  960 IFA=136:IFW>1:W=W-1:IFW=10 W=9
  970 IFW<>OW PRINTTAB(OW+2,2);" ":OW=W
  980 MOVEX,Y:DRAWX+ox,Y+oy:MOVEX,Y:DRAW
X+x,Y+y
  990 UNTILA=13 AND NOT (x=0 AND y=0)
 1000 PROCq
 1010 H=FNs(64):PROCw(500):*FX15
 1020 S=FNs(1152)
 1030 sh=sh+1:COLOUR3:PRINTTAB(12,4);sh;
" "
 1040 ENDPROC
 1050 DEFFNs(h)
 1060 Q=0:QD=8:GCOL3,6:DT=RND(10):TIME=0
 1070 REPEAT
 1080 MOVEh,Q+874:DRAWh+64,Q+874
 1090 Q=Q+QD:IFQ=112 OR Q=-112 QD=-QD:MO
VEh,Q+874:DRAWh+64,Q+874
 1100 UNTILINKEY-99 AND TIME>DT:=Q/8
 1110 DEFPROCm
 1120 IF<X>0 a=DEG(ATN(y/x)) ELSE a=90
 1130 D=((PS-ABS(S)-ABS(S))/100)*l(W)*12
80/yd
 1140 IFa<>ABS(a)a=180-ABS(a)
 1150 IFy<0 OR (<X0 AND y=0) a=a+180
 1160 a=a+H+H
 1170 ENDPROC
 1180 DEFPROCa
 1190 GCOL3,gc:MOVEX,Y:DRAWX+x,Y+y
 1200 xb=0:yb=0:oxb=0:oyb=0:OP=0:P=0:ST=
0:LX=0:LY=0
 1210 PROCz(X,Y)
 1220 c=D*COS(RAD(a)):s=D*SIN(RAD(a)):t=
TAN(a(W))
 1230 REPEAT:oxb=xb:oyb=yb
 1240 xb=xb+c/80:yb=yb+s/80:X1=X+xb:Y1=Y
+yb
 1250 hx=SQR((xb^2)+(yb^2)):h=hx*t-((hx^
2)*t)/D
 1260 IFP<>OP LX=xb:LY=yb
 1270 IF(P=4 AND h<=0) OR (P=0 AND OP<>0
) OR (P=5 AND h<=20) ST=1 ELSE PROCz(X+o
xb,Y+oyb):OP=P:P=POINT(X1,Y1):PROCz(X1,Y
1)
 1280 IFX1<68 OR X1>1220 OR Y1<52 OR Y1>
684 ST=1
```

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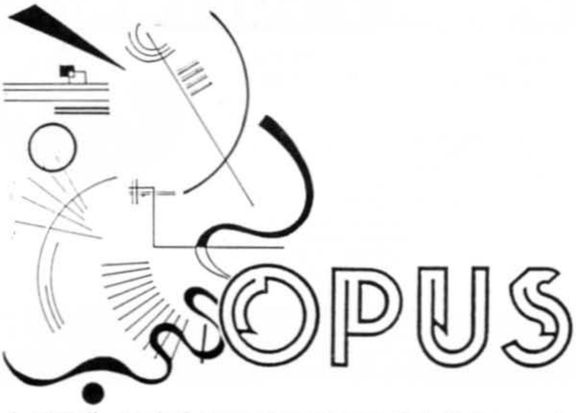

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```
 1290 UNTILhx>=D OR ST=1 OR WH=1
 1300 PROCr
 1310 ENDPROC
 1320 DEFPROCr
 1330 GCOL0,P:PROCz(X+oxb,Y+oyb)
 1340 GCOL3,gc:IFST=0 AND P<>0 X=X1:Y=Y1
 ELSE IF P<>0 X=X+LX:Y=Y+LY
 1350 IFST=1:IFP=0 X=X+LX:Y=Y+LY
 1360 GCOL0,P:PROCz(X1,Y1):GCOL3,gc
 1370 x=64:y=0:MOVEX,Y:DRAWX+x,Y
 1380 IFP=5:IFOP<>0 PRINTTAB(3,6);SPC(3)
;"Trees !!   ":PROCw(2000)
 1390 SM=100:IFP=3 SM=60:PRINTTAB(3,6);S
PC(2);"Bunker !!!  ":PROCw(2000)
 1400 IFP=0 PRINTTAB(3,6);"Out of bounds
!":PROCw(2000)
 1410 ENDPROC
 1420 DEFPROCq
 1430 COLOUR7:PRINTTAB(3,6);" Strength:
  %":COLOUR3:PS=SM
 1440 *FX15
 1450 REPEAT
 1460 IFINKEY-42:IFPS>30 PS=PS-1
 1470 IFINKEY-58:IFPS<SM PS=PS+1
 1480 PRINTTAB(13,6);PS;:IFPS<100 PRINT"
 "
 1490 UNTILINKEY-106
 1500 ENDPROC
 1510 DEFPROCw(WA)
 1520 FORw=0TO WA:NEXT
 1530 ENDPROC
 1540 DEFPROCg
 1550 PROCw(1000):PRINTTAB(3,6);"On the
green !"
 1560 COLOUR128:COLOUR1:PRINTTAB(3,1);"G
reen Speed :";GR;TAB(3,2);SPC(14)
 1570 PROCk:PROCy
 1580 VDU5,23,1,0;0;0;0;:GCOL0,4:MOVE640
,400:VDU230:GCOL0,7
 1590 X=80+RND(10)*8:Y=116+RND(80)*4:dx=
X:dy=Y
 1600 MOVEX,Y:PRINTCHR$231
 1610 REPEAT:VDU4:PROCd:VDU5,23,1,0;0;0;
0;
 1620 H=FNs(64):PROCw(500):*FX15
 1630 S=FNs(1152)+14
 1640 mo=0:REPEAT
 1650 px=ABS((S*2*(0.1+GR/100))*(640-X)+
H*200)*(640-X)/ABS(640-X)*mo/300:py=ABS(
(S*2*(0.1+GR/100))*(402-Y)+H*200)*(402-Y
)/ABS(402-Y)*mo/300
 1660 GCOL3,5:MOVEdx,dy:VDU231:MOVEX+px,
Y+py:VDU231
 1670 dx=X+px:dy=Y+py:mo=mo+1
 1680 dt=INT(SQR(((640-dx)^2)+((402-dy)^
2)))
 1690 UNTIL dt<30 OR mo>=75 OR dt<30 OR
mo>5 AND (d<X80 OR dx>1172 OR dy<96 OR d
>Y670)
 1700 X=X+px:Y=Y+py:VDU4:sh=sh+1:COLOUR3
:PRINTTAB(12,4);sh;" ":PROCy:VDU5,23,1,0
;0;0;0;
 1710 UNTILdt<30
 1720 VDU4,23,1,0;0;0;0;
 1730 f=1:ENDPROC
 1740 DEFPROCy
 1750 PROCt
 1760 COLOUR5:PRINTTAB(18,2)CHR$226;TAB(
1,2)CHR$232;TAB(1,6)CHR$232
 1770 ENDPROC
 1780 DEFPROCd
 1790 dt=SQR(((640-dx)^2)+((402-dy)^2)):
ds=INT(dt*yd/1280)
 1800 d$=STR$(ds):IFds<100 d$="0"+d$:IFd
s<10 d$="0"+d$
 1810 COLOUR4:PRINTTAB(3,8);"Distance :
";d$
 1820 ENDPROC
 1830 DEFPROCk
 1840 VDU24,40;40;1244;700;:GCOL0,128:CL
G:VDU24,72;72;1212;668;:GCOL0,130:CLG:VD
U26
 1850 ENDPROC
 1860 DEFPROCz(qx,qy)
 1870 PLOT69,qx,qy:PLOT69,qx+4,qy:PLOT69
,qx,qy+4:PLOT69,qx+4,qy+4
 1880 ENDPROC
 1890 DEFPROCe
 1900 IFERR=17 PRINT''"Escape":END
 1910 PRINT''"No file ";T$:PRINT''"Press
'C'":REPEATA$=GET$:UNTILA$="C":RUN
 1920 ENDPROC
 1930 DEFPROCx(Q%)
 1940 P%=PAGE:IFP%<=Q% ENDPROC
 1950 L%=TOP-P%:PRINTCHR$129CHR$136"Relo
cating...."
 1960 FORM%=0TOL%-1 STEP4
 1970 Q%!M%=P%!M%:NEXT
 1980 PAGE=Q%:A%=138:X%=0:*FX15
 1990 $&100="OLD"+CHR$13+"RUN"+CHR$6+CHR
$13
 2000 FORL%=&100TO&108:Y%=?L%
 2010 Z%=USR&FFF4:NEXT:VDU21
 2020 ENDPROC
```

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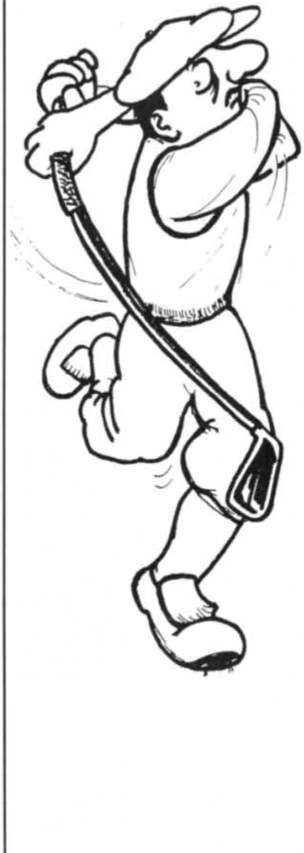

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```
  10 =    0 0   350 = 8A47 C   690 = 9A84 6  1030 = 4672 3  1370 = 34DC 4  1710 = 11F0 6
  20 =    0 0   360 = 3E1C 6   700 = D08E F  1040 = ED0F D  1380 = AFC7 7  1720 = 1C7D 9
  30 =    0 0   370 =  615 4   710 = 431D 4  1050 = 8893 9  1390 = C026 7  1730 = 34F2 5
  40 = 5D9B B   380 = E934 7   720 = 90C8 A  1060 = 21D0 C  1400 = B85E 6  1740 = BDD8 8
  50 = DACE B   390 = E4B9 9   730 = 90B4 C  1070 = BFBA 1  1410 = ED0F C  1750 = 4BB0 C
  60 = 3DC0 6   400 = E383 E   740 = 90B6 7  1080 =  281 7  1420 = 3CD0 9  1760 = 9B48 0
  70 = FA72 E   410 = 7B4B 9   750 = ED0F 8  1090 = 9735 9  1430 = A9F1 1  1770 = ED0F F
  80 = 9A82 A   420 = F570 8   760 = 6C75 3  1100 = 3D8B 8  1440 = A022 1  1780 = 7E44 C
  90 = 585D 4   430 = DC13 D   770 = D2D8 4  1110 = EF6D 2  1450 = BFBA B  1790 = E16D 5
 100 = 5E06 D   440 = E8EA 9   780 = 9699 A  1120 = 6412 8  1460 = 3678 3  1800 = 6F2A 6
 110 = B41E 8   450 = BFBA 9   790 = A27A 0  1130 = 6135 7  1470 = C39C 3  1810 = 1C44 5
 120 = 9334 F   460 =  4A0 C   800 = A6EB 1  1140 = 5CF6 6  1480 = 7EA7 D  1820 = ED0F 6
 130 = 3E58 2   470 = B8F3 C   810 = ED0F A  1150 = E43E 6  1490 = 9743 9  1830 = 8FAB A
 140 = FEB8 6   480 = 7C95 C   820 = B1B6 E  1160 = 57B4 4  1500 = ED0F 6  1840 = 82FA 9
 150 = DEDA B   490 =  D8C D   830 = B7D0 2  1170 = ED0F 1  1510 = 29AF E  1850 = ED0F E
 160 = EF0F E   500 = 325F 7   840 = ED0F 8  1180 = 2EE1 9  1520 = 7BA5 8  1860 =  BFF B
 170 = 4ACA D   510 = ED0F 3   850 = 2CF1 4  1190 = D6A4 F  1530 = ED0F C  1870 = 5618 E
 180 = 7E43 6   520 = 2E32 0   860 = 31E9 E  1200 = 5FFF E  1540 = 4E27 3  1880 = ED0F 3
 190 = C815 C   530 = B647 D   870 = 5F93 A  1210 = 844F F  1550 = EB88 2  1890 = 6E65 0
 200 = FD2E 6   540 = F60E 9   880 = 7805 1  1220 = 81DB 2  1560 = 6A1C 8  1900 = A528 3
 210 = AFE9 2   550 = 4C9F A   890 = 286C C  1230 = 5467 C  1570 = A461 C  1910 = 91EC 8
 220 = C3DB 4   560 = E9F8 C   900 = C993 F  1240 = F012 7  1580 = 5021 6  1920 = ED0F B
 230 = 54BC 5   570 = EA43 1   910 = E5BC F  1250 = 81D8 9  1590 = 7466 3  1930 = 3918 8
 240 = A70A F   580 = 7803 5   920 = C1CC 5  1260 = 3BF5 E  1600 = EFAE C  1940 = 8F78 8
 250 = D3F4 F   590 = ED0F D   930 = 5E47 8  1270 = E612 6  1610 = 3801 A  1950 = 7545 B
 260 = DDCD B   600 = 6C85 F   940 = C299 C  1280 = A1C3 B  1620 = 447F 0  1960 = 7A98 6
 270 = EB3D 1   610 = E81A B   950 = D3B0 F  1290 = 9999 0  1630 = 6B9C A  1970 = E316 5
 280 = ED0F C   620 = C987 4   960 = 86A9 4  1300 = 2B76 9  1640 = E850 C  1980 = AF02 2
 290 = C17E 2   630 = A627 8   970 = C389 6  1310 = ED0F 0  1650 = E57D 4  1990 = 889C D
 300 = 5D06 A   640 = 94F5 9   980 = 441E 9  1320 =  CB3 8  1660 = 62F3 9  2000 = 7ACF 8
 310 = DF4E C   650 = 3735 5   990 = DB2B C  1330 =  EF1 2  1670 = E14F 9  2010 =  45A 2
 320 = EF0F 1   660 = ED0F 0  1000 = 1B15 A  1340 = 97BF D  1680 = 2558 5  2020 = ED0F 9
 330 = 2C39 8   670 = CF2F 6  1010 = 447F 2  1350 = 59F0 E  1690 = 1103 0
 340 = 7E43 5   680 = FF51 7  1020 = 1454 D  1360 = B63B F  1700 = E351 1
```

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Listing II

```
   10 REM Golf Designer
   20 REM By Jon Perry and Pali Rao
   30 REM (c) The Micro User
   40 ONERROR PROCerror:RUN
   50 MODE2
   60 VDU23,1,0;0;0;0;
   70 PROCtitle
   80 PROCscreen
   90 PROCdesign
  100 END
  110 DEFPROCinit
  120 DIMS(36),C(36)
  130 FORI=0TO36
  140 S(I)=SIN(RAD(I*10)):C(I)=COS(RAD(I
*10)):NEXT
  150 X=640:Y=368:c=0:C=2
  160 sc=320:pa=4:GR=0
  170 VDU23,224,0,240,128,135,132,180,14
8,244,23,225,0,0,0,0,64,0,64,0
  180 ENDPROC
  190 DEFPROCtitle
  200 GCOL0,130:CLG
  210 FORI=0TO6:PROCb(7,32+I*8,844+I*4,1
240-I*8,916-I*4):NEXT
  220 PROCb(1,48,852,1224,908)
  230 PROCb(1,32,844,1240,916)
  240 COLOUR135:COLOUR0:PRINTTAB(1,4);"B
y J.Perry & P.Rao"
  250 PROCinit
  260 PROCdc(1,640,300,50,50)
  270 MOVE624,260:MOVE656,260:PLOT85,640
,100
  280 PROCdc(2,640,350,100,70)
  290 PROCdc(7,640,440,150,150)
  300 GCOL0,0
  310 VDU5:MOVE512,496:PRINT"G":MOVE576,
464:PRINT"O":MOVE640,432:PRINT"L":MOVE70
4,384:PRINT"F":VDU4
  320 VDU23,1,0;0;0;0;
  330 T=1:TIME=0
  340 REPEAT:T=T+1:VDU19,1,T;0;
  350 IFT=1 T=T+1
  360 IFT=7 T=0
  370 FORwait=1TO100:NEXT
  380 UNTILNOTINKEY0 OR TIME>700
  390 GCOL0,128:CLG:COLOUR0:COLOUR129:VD
U19,1,1;0;
  400 ENDPROC
  410 DEFPROCscreen
  420 PROCb(1,32,32,1248,704)
  430 FORI=0TO32:PROCb(1-(I=0),32+I*8,73
6+I*4,1248-I*8,992-I*4):NEXT
  440 PROCb(7,124,796,264,932)
  450 PROCb(7,300,852,724,908)
  460 PROCb(6,816,840,1160,980)
  470 PROCb(6,752,744,1224,820)
  480 PROCb(4,304,756,520,812)
  490 PROCb(4,562,756,648,812)
  500 PROCb(4,364,916,660,972)
  510 PRINTTAB(6,2)CHR$224CHR$225
  520 PROCchcol
  530 PROCscale
  540 PROCdet
  550 ENDPROC
  560 DEFPROCb(CL,x,y,x1,y1)
  570 CCOL0,CL
  580 MOVEx,y:DRAWx,y1:DRAWx1,y1:DRAWx1,
y:DRAWx,y
  590 ENDPROC
  600 DEFPROCdesign
  610 REPEAT:C2=FNch:GCOL3,C2:IFC2=0 GCO
L3,1
  620 PROCcur:PROCdis(16,16)
  630 PROCkeys
  640 UNTILFALSE
  650 ENDPROC
  660 DEFPROCcur
  670 IFINKEY-1 J=16 ELSE J=8
  680 IFINKEY-67:IF<X1232 X=X+J
  690 IFINKEY-98:IFX>56 X=X-J
  700 IFINKEY-73:IFY<688 Y=Y+J/2
  710 IFINKEY-105:IF>Y48 Y=Y-J/2
  720 ENDPROC
  730 DEFPROCkeys
  740 IFINKEY-2:IFINKEY-34:PROCwipe(C)
  750 IFINKEY-114:PROCspray
  760 IFINKEY-115 PROCcircle
  770 IFINKEY-21:IFC<6 C=C+1:IFC=1 C=2
  780 IFINKEY-116:IFC>0 C=C-1:IFC=1 C=0
  790 IFINKEY-21 OR INKEY-116 PROCchcol
  800 IFINKEY-122:IFsc>100 sc=sc-5:PROCs
cale
  810 IFINKEY-26:IFsc<700 sc=sc+5:PROCsc
ale
  820 IFINKEY-58:sc=100:PROCscale
  830 IFINKEY-42:sc=700:PROCscale
  840 IFINKEY-18:pa=3:PROCdet
  850 IFINKEY-19:pa=4:PROCdet
  860 IFINKEY-20:pa=5:PROCdet
  870 IFINKEY-53:pa=6:PROCdet
  880 IFINKEY-118:PROCfile(0)
  890 IFINKEY-119:PROCfile(1)
  900 IFINKEY-82:IFGR>0 GR=GR-1:PROCdet
  910 IFINKEY-68:IFGR<9 GR=GR+1:PROCdet
  920 ENDPROC
  930 DEFPROCcircle
  940 xh=50:yh=50:REPEAT:PROCsize:UNTILI
NKEY-74 OR INKEY-33
  950 IFINKEY-33 ENDPROC
  960 PROCdc(C,X,Y,xh,yh)
  970 ENDPROC
  980 DEFPROCdc(col,r,s,h1,h2)
  990 GCOL0,col
 1000 FORT=0TO36:IFT=0 MOVEr,s
 1010 a=r+S(T)*h1:b=s+C(T)*h2
 1020 MOVEr,s:PLOT85,a,b:NEXT
 1030 ENDPROC
 1040 DEFPROCsize
 1050 PROCdis(xh,yh)
 1060 IFINKEY-1 J=8 ELSE J=4
 1070 IFINKEY-99:IFX+yh<1232 AND X-yh>56
:xh=yh
 1080 IFINKEY-58:IFY+yh<692 AND Y-yh>48:
yh=yh+J
 1090 IFINKEY-42:IFyh>8:yh=yh-J
 1100 IFINKEY-26:IFxh>8:xh=xh-J
 1110 IFINKEY-122:IFX+xh<1232 AND X-xh>5
6:xh=xh+J
 1120 ENDPROC
 1130 DEFPROCspray
 1140 REPEAT:GCOL0,C:PROCcur
 1150 MOVEX-4,Y-4:MOVEX+4,Y-4:PLOT85,X-4
,Y+4:PLOT85,X+4,Y+4
 1160 C2=C:IFC2=0 C2=1
 1170 GCOL3,C2:FORI=0TO1:MOVEX-8,Y-8:DRA
WX+8,Y-8:DRAWX+8,Y+8:DRAWX-8,Y+8:DRAWX-8
,Y-8:NEXT
 1180 UNTILINKEY-33
 1190 ENDPROC
 1200 DEFPROCchcol
 1210 FORB=0TO16:PROCb(C,128+B*4,928-B*4
,256-B*4,800+B*4):NEXT
 1220 IFC=0 M$="Out    "
 1230 IFC=2 M$="Grass "
 1240 IFC=3 M$="Bunker"
 1250 IFC=4 M$="Water "
 1260 IFC=5 M$="Trees!"
 1270 IFC=6 M$="Green!"
 1280 PRINTTAB(5,4);M$
 1290 ENDPROC
 1300 DEFPROCfile(type)
 1310 IFtype=0 TY$="Save?" ELSE TY$="Loa
d?"
 1320 PRINTTAB(13,2)TY$;TAB(13,4)"(Y/N)"
:*FX4,1
 1330 A$=GET$:N=INSTR("YN",A$)
 1340 IFN=0 GOTO1330
 1350 IFN=2 GOTO1410
```

MICRO MEMORIES

Facts and tips you may have forgotten...or never known

THE continually flashing cursor can often become annoying, but you can easily curb its antics to flash, steady or off. Just use VDU 23,1 followed by a string of parameters to present the cursor in the best way for your application:

Command	Effect
VDU 23,1,0;0;0;0;	Switch cursor off
VDU 23,1,1;0;0;0;	Switch cursor on and make it flash
VDU 23,1,2;0;0;0;	Switch cursor on without flashing

Note that this works on versions of the OS above 1.0. Most are, and you can find out which you have by entering *HELP. On earlier ones the command is:

```
VDU23;8202;0;0;0;
```

Although switching the cursor off with this command is not as flexible – it can only be switched back on with a mode change – it is a better one to use if your program is to be circulated widely in case it is used by someone with an early OS.

```
 1360 IFtype=0 PROChole
 1370 PRINTTAB(13,2);"Enter"TAB(13,4);"t
itle"
 1380 PROCinput:T$=N$
 1390 IFtype=0:PROCsave
 1400 IFtype=1:PROCload
 1410 PROCcl:*FX4,0
 1420 ENDPROC
 1430 DEFPROCcl
 1440 PRINTTAB(13,2)SPC5TAB(13,4)SPC5TAB
(12,7)SPC7
 1450 ENDPROC
 1460 DEFPROCinput
 1470 PRINTTAB(12,7);".......";TAB(12,7)
;:N$="":REPEAT
 1480 A=GET:IFA=13 GOTO1520
 1490 IFA=127 AND N$>"" N$=LEFT$(N$,LEN(
N$)-1):PRINTCHR$(A);
 1500 IFA<48 OR A>90 GOTO1480
 1510 IFLEN(N$)<7 N$=N$+CHR$(A):PRINTCHR
$(A);:ELSE SOUND1,-10,100,2
 1520 UNTIL A=13
 1530 ENDPROC
 1540 DEFPROCdis(G,H)
 1550 FORP=0TO1:MOVEX-G,Y:DRAWX+G,Y:MOVE
X,Y-H:DRAWX,Y+H:NEXT
 1560 ENDPROC
 1570 DEFPROCscale
 1580 G=0:OX=0:CS=1
 1590 REPEAT:G=G+sc:CS=CS EOR 1:GCOL 0,(
CS*6)+1
 1600 MOVEOX,4:MOVEOX,20:PLOT85,OX+sc,4:
PLOT85,OX+sc,20
 1610 PROCb(4,0,0,1276,24)
 1620 yd=INT(700/sc*130)
 1630 OX=G:UNTILG>1248:PROCdet
 1640 ENDPROC
 1650 DEFPROCdet
 1660 GR$="0"+STR$(GR)
 1670 PRINTTAB(9,7);pa;TAB(8,2);GR$;TAB(
5,7);yd
 1680 ENDPROC
 1690 DEFPROChole
 1700 PROCcl
 1710 PRINTTAB(13,2);"Hole?"
 1720 REPEAT:C2=FNch:GCOL3,C2:IFC2=0 GCO
L3,1
 1730 PROCcur
 1740 PROCdis(16,16):UNTILINKEY-74 AND C
2=6
 1750 HX=X:HY=Y:FORwait=1TO200:NEXT
 1760 PRINTTAB(13,2);"Tee? "
 1770 REPEAT:C2=FNch:GCOL3,C2:IFC2=0 GCO
L3,1
 1780 PROCcur
 1790 PROCdis(16,16):UNTILINKEY-74 AND F
Nch=2
 1800 TX=X:TY=Y:PROCcl:*FX15
 1810 PROCcl:*FX15
 1820 ENDPROC
 1830 DEFPROCsave
 1840 OSCLI("SAVE "+T$+" 468E 8000")
 1850 T$="@."+T$
 1860 ch=OPENOUT(T$)
 1870 PRINT#ch,yd,pa,GR,HX,HY,TX,TY
 1880 CLOSE#0
 1890 ENDPROC
 1900 DEFPROCload
 1910 OSCLI("LOAD "+T$+" 468E")
 1920 T$="@."+T$
 1930 ch=OPENIN(T$)
 1940 INPUT#ch,yd,pa,GR,HX,HY,TX,TY
 1950 CLOSE#0
 1960 PROCdet
 1970 ENDPROC
 1980 DEFFNch
 1990 =POINT(X,Y)
 2000 DEFPROCwipe(c)
 2010 PRINTTAB(13,2);"Wipe?";TAB(13,4);"
(Y/N)":*FX4,1
 2020 A$=GET$:N=INSTR("YN",A$)
 2030 IFN=0 GOTO2020
 2040 IFN=2 GOTO2060
 2050 FORI=0TO74STEP2:PROCb(c,40+I*8,36+
I*4,1240-I*8,700-I*4):J=75-I:PROCb(c,40+
J*8,36+J*4,1240-J*8,700-J*4):NEXT
 2060 PROCcl:*FX4
 2070 ENDPROC
 2080 DEFPROCerror
 2090 IFERR=190 GOTO2160
 2100 *SA."error" 468E 8000
 2110 yd=600:pa=5:GR=0:HX=900:HY=400:TX=
300:TY=400
 2120 ch=OPENOUT("@.error")
 2130 PRINT#ch,yd,pa,GR,HX,HY,TX,TY
 2140 CLOSE#0
 2150 VDU22,7:IFERR<>190 GOTO2170
 2160 PRINT''"Catalogue full":END
 2170 IFERR=214 PRINT''"No file : ";T$
 2180 IFERR=17 PRINT''"Escape"
 2190 IFERR=195 PRINT''"File ";T$;" lock
ed"
 2200 PRINT''"Current screen and hole in
formation"
 2210 PRINT'"saved under file 'error'"
 2220 PRINT'''"Press 'C' to continue..."
 2230 REPEAT:A$=GET$:UNTILA$="C"
 2240 ENDPROC
```

Get it right!

```
  10 =    0 0   390 = 11BE 4                 1110 = AE61 4  1490 = 4C9F 8  1870 = FB09 4
  20 =    0 0   400 = ED0F 7                 1120 = ED0F 2  1500 = 930D A  1880 = 9EE3 6
  30 =    0 0   410 = F5B9 A                 1130 = 6174 5  1510 = 6461 A  1890 = ED0F 8
  40 = 85B4 4   420 = A5CA 1                 1140 = 12E5 9  1520 = 7803 8  1900 = 24A1 F
  50 = DA59 B   430 = 4BBB B   770 = 1E89 E  1150 = 5A82 6  1530 = ED0F 6  1910 = E81A 5
  60 = 1E64 F   440 = 2A5C B   780 = F8A0 D  1160 = A684 1  1540 = 3E53 A  1920 = C987 8
  70 = 5255 7   450 = A8B5 3   790 = 311B 0  1170 = 9141 5  1550 = F052 2  1930 = A627 5
  80 = 9538 2   460 =  FE1 1   800 = 81AB 3  1180 = 41A2 3  1560 = ED0F 0  1940 = A89B 6
  90 = EFCF A   470 = CF4D A   810 = 2787 3  1190 = ED0F E  1570 = 5EDD F  1950 = 9EE3 F
 100 = FD2E D   480 = CCFC 9   820 = EF8D 4  1200 = EE82 3  1580 = 7921 2  1960 = FF42 5
 110 = 344C 1   490 = B559 C   830 = 5E8A 4  1210 = BE56 E  1590 =  A92 E  1970 = ED0F 4
 120 = E549 1   500 = 96E1 4   840 = 84FD 5  1220 = D3D1 0  1600 = 7920 E  1980 = 430E A
 130 = B2E3 7   510 = E608 D   850 = 94F5 B  1230 = CC8F 5  1610 = 309D C  1990 = 4DC2 2
 140 = 9118 8   520 = 45E6 7   860 = AE0D D  1240 = 5A89 0  1620 = 748B C  2000 = 9916 D
 150 = D9FC 5   530 = F5B9 8   870 = 105C 2  1250 = 8CF8 1  1630 =  8B2 3  2010 = E27E A
 160 = F575 6   540 = FF42 1   880 = 9244 E  1260 = 6F77 1  1640 = ED0F C  2020 = 7FB1 F
 170 = 6B1B 5   550 = ED0F F   890 = CE30 1  1270 = 4E19 A  1650 = E9DA 9  2030 = A7C9 A
 180 = ED0F 1   560 = 6916 9   900 = 9BA5 7  1280 = E685 B  1660 = 570B 0  2040 = 7C2F A
 190 = F931 D   570 = F810 C   910 = 228C 7  1290 = ED0F F  1670 = 57FD E  2050 = D05E 4
 200 = C3D2 6   580 = F109 E   920 = ED0F E  1300 = 1784 C  1680 = ED0F 5  2060 = B621 D
 210 = BB7F C   590 = ED0F 9   930 = 10C0 7  1310 = E4A2 2  1690 = 882D 1  2070 = ED0F 6
 220 = F00E E   600 = 8F4E D   940 = 94A5 3  1320 =  841 8  1700 = 7E61 1  2080 = D7A7 B
 230 = B337 6   610 = CE20 9   950 = 8489 A  1330 = 7FB1 9  1710 = D61D B  2090 = F362 6
 240 = 1B45 F   620 = 5C89 4   960 = 5BD5 A  1340 = EBFB 1  1720 = CE20 4  2100 = 3A91 2
 250 = DEBB D   630 = B0B6 E   970 = ED0F 8  1350 =  84B A  1730 = 1967 0  2110 = 49C8 D
 260 = CBC3 A   640 = E014 9   980 = 5F69 D  1360 =  EAE 8  1740 = 3A90 9  2120 = 4BD0 7
 270 = 1A96 0   650 = ED0F 9   990 =  64E E  1370 = 74D3 A  1750 = 945A 4  2130 = FB09 8
 280 = 7726 D   660 =  FFF E  1000 =  890 B  1380 = DD6A 6  1760 = F8E1 C  2140 = 9EE3 F
 290 = 418A 5   670 = AB97 7  1010 = AC8E F  1390 = 6029 3  1770 = CE20 F  2150 = 361D F
 300 = 130E 4   680 = FAA6 5  1020 = 346D E  1400 = 86C5 3  1780 = 1967 8  2160 = 66DF C
 310 =  2CC A   690 = B284 A  1030 = ED0F 0  1410 = F530 D  1790 = 279B E  2170 = CE03 F
 320 = 1E64 7   700 = 8281 2  1040 = 96E0 3  1420 = ED0F F  1800 = C3C7 0  2180 = 18CE 8
 330 = BF5D F   710 = 55AE 2  1050 = 9170 F  1430 = EFE4 9  1810 = 7F1E 4  2190 = 210C A
 340 =  B7A 2   720 = ED0F A  1060 = 9AC3 A  1440 = 9D9A 1  1820 = ED0F 9  2200 = 4637 4
 350 = 1076 A   730 = 5A41 D  1070 = EE67 E  1450 = ED0F B  1830 = 7A2C 5  2210 =   1F D
 360 = 665F F   740 = 7CEC 5  1080 = 77BB 9  1460 = EA07 6  1840 = D676 3  2220 = 51EF 2
 370 = 6019 C   750 = B248 F  1090 = 42AF 1  1470 =  7B1 1  1850 = C987 8  2230 = 3E54 3
 380 = E441 B   760 = 9035 E  1100 = D406 E  1480 = C97E 6  1860 = AE93 2  2240 = ED0F 3
```

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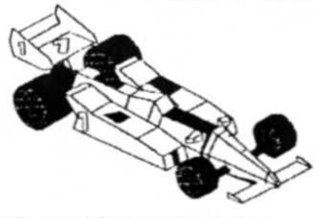

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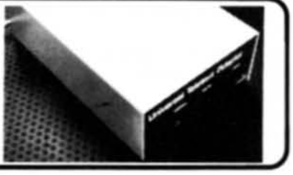

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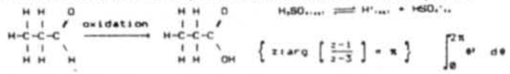

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Golden Figurine	(Solution + maps)
Exile	(Helpsheet - Part 2)
Exile	(Part 3 - solution + map)
Enthar 7	(Solution)
Exile	(Helpsheet)
Terramex	(Solution)
The Hobbit	(Solution)
Citadel	(Solution + map)
Plan B2	(Solution + map)
Spy Vs Spy	(Helpsheet)
Spellbinder	(Solution + maps)
Elixir	(Solution + maps)
Paperboy	(Helpsheet)
Twin Kingdom Valley	(Solution + map)
Omega Orb	(Solution + map)
Elite	(Helpsheet + tips)
Tarzan	(Solution + map)
Codename: Droid	(Solution + map)
Thunderstruck	(Solution + map)
Philosopher's Quest	(Solution + map)
Rick Hanson	(Solution)
Thrust	(Maps)
Last Ninja	(Solution + maps)
Hoverbod	(Passwords + cheats)
Frak!	(Helpsheet)
Thunderstruck 2	(Solution + map)
Kourtyard	(Helpsheet + map)
Durjunz	(Helpsheet + 25 maps)
Gisburnes Castle	(Solution + map)
Palace of Magic	(Solution + map)
Impact	(Helpsheets + passwords)
Icarus	(Helpsheet + maps)
Sphinx Adventure	(Solution + map)
Anarchy Zone	(Helpsheet + passwords)
Repton 2	(Helpsheet + 18 maps)
Bonecruncher	(All passwords + maps)
Skirmish	(Helpsheet)
Kayleth	(Solution)
Starquake	(Helpsheet)
Rick Hanson 2	(Solution)
The Hunt	(Solution)
Stormcycle	(Solution + map)

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*Due for release 1st week February 1990

All the above games will work on Archimedes A3000, 310 and 400 series.

ARCADE SOCCER

The Fourth Dimension

Arcade Soccer really is football action at it's very best.
Using an overhead view to make game play as exciting as possible it features everything that you could want in a football game. Corners, sliding tackles, throw-ins, goal kicks, dribbling, shooting, passing and much more.

All versions work with keyboard or joysticks.
"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment - and not a lot of games do that. Value for money...10 out of 10" ***The Micro User Oct '89***

Prices Above and Below

The Art Studio

from Impact Software

An ingenious and comprehensive design program from Impact Software allowing you to create superb pictures and save them to cassette or disc.

It features a host of easy to use commands such as Zoom, Paint, Fill, Copy etc, to help any budding artist. No roms, chips, mice or other add-ons are required. Just load and go! Keyboard or joystick controls. Works in modes 4 & 5. This must be the best value utility on the market today.

From Only £9.95 Prices Below

HOLED OUT – 3D GOLF

Due to overwhelming public demand The 4th Dimension has now produced 2 volumes of extra courses for their superb 3D golf game Holed Out. Each volume contains 2 superbly designed brand new courses plus the original Holed Out program; therefore you do not need the original Holed Out in order to play them.

"I play golf and this game is the closest thing I've seen to the real game on a computer". ***Archive, June '89***
"I wouldn't have thought it possible to get a better simulation out of the beeb." ***B BC Acorn User, June '89.***
"The 3D perspective graphics are stunning" ***Electron User GOLDEN GAME June '89***
"Holed Out is great.... The game plays very well and the graphics are superb."
Popular Computing Weekly, March 1989
"The best golf simulation I've ever seen on any Acorn machine." ***The Micro User, June '89***
"The Electron version is brilliant - it's almost the same as playing at Gleneagles. Unreservedly recommended."
A & B Computing Game of the Month, June '89

Prices above and opposite

TITLE & PUBLISHER	BBC or Electron Cassette	BBC 5 1/4" Disc	Master Compact 3 1/2" Disc
M = Master Compatible			
IMPACT SOFTWARE (Discs are BBC B & Master Compatible 40/80)			
The Art Studio M	9.95	12.95	-
Orbital M	4.95	5.95	6.95
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Zenon M	4.95	4.99	6.95
Cheat It Again, Joe 1	2.99	4.99	-
Cheat It Again, Joe 2	2.99	4.99	-
Cheat It Again, Joe 3	2.99	4.99	-
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Paperboy M	-	11.95	-
Airwolf (BBC Only)	4.95	-	-
THE FOURTH DIMENSION			
U.I.M. (Disc only BBC B or B+ with sideways RAM and Master Series) M	-	19.95	21.95
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Holed Out (3D Golf) M	9.95	11.95	12.95
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Holed Out Extra Courses Vol 2 M	9.95	11.95	12.95
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Last Ninja M (BBC Only)	-	-	11.25
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The Life of Repton M	4.95	-	-
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M = Master Compatible		
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M = Master Compatible		
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U.I.M. (ULTRA INTELLIGENT MACHINE) The Fourth Dimension

Possibly the most exciting BBC release for a long time. U.I.M is a massive 3D vector graphic action adventure set in the future. The greenhouse effect has melted the icecaps and all life now exists in hundreds of colonies under the sea. You must travel the oceans, completing missions, trading in currencies, commodies and shares in search of the U.I.M. There are many types of ship you will encounter in your highly manoeuvrable futuristic submarine and you must develop your weaponry and equipment to deal with the challenges you will face. U.I.M. is an opportunity to step into another world. It will fascinate you for weeks and possibly months to come.
U.I.M. is disc only and will run on BBC B or B+ with sideways RAM and Master Series Computers.
The fully enhanced Archimedes version is also now available.

"Will I keep playing it the way I've played Elite for years? And the answer is yes. Graphics 10, Playability 10, Value for Money 10" ***The Micro User, Nov' 89.***

Prices above and opposite

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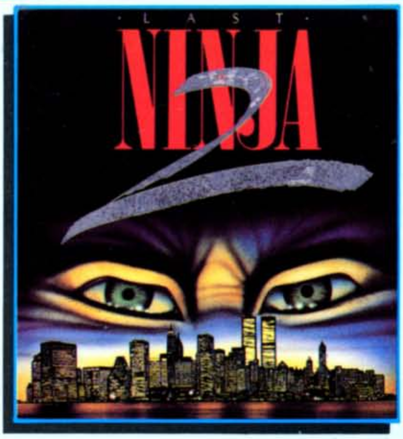

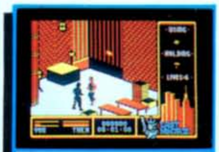
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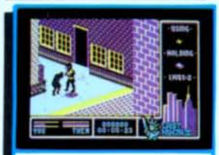
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LAST NINJA 2 - Back with a Vengeance!

Born in a time of peace, lived in a time of war; the shadow warrior returns. Leaping the abyss of time he comes to fulfil his destiny!

DATELINE: 1990 THE PLACE: Downtown New York
THE QUEST: To destroy the eternal evil........Kunitoki!

Lots more fiendish adversaries, more colourful screens with superb graphics, a score-line, a timer... and lots and lots more exciting Ninja action. Are you ready for the thrills and skills of the Ninja in crime-filled Manhattan? Can you survive the six action-packed levels?

You start in the notorious CENTRAL PARK, with thugs, police and bees to get past, and shuriken stars and hamburgers to collect. Now to THE STREET, littered with down-and-outs and meths bottles. Take care in THE SEWERS to avoid the darkness and the crocodile. On to the forbidding opium factory in THE CELLAR and then to THE OFFICE and a secret computer code. Finally to KUNITOKI CASTLE with its immortal adversaries and the trickiest puzzle of all!

PLAY IT AGAIN SAM 12
A New Action-Packed Four-Game Compilation

THE LAST NINJA

The state of the martial arts...fighting with fists, swords, numchukas and shurikens, through six puzzling levels. The top BBC/Electron game of 1989.

"Ninja is fast, furious and totally addictive"...Micro User

SKIRMISH

A brilliant, full-feature version of the classic joust game,with beautifully animated sprites. 1 and 2 player options.

"I can recommend Skirmish whole-heartedly. It is one of the most playable games I have ever seen"...Micro User

BY FAIR MEANS OR FOUL

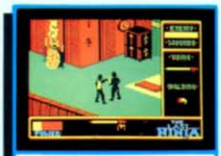
A realistic and entertaining boxing simulation. You can even cheat...if the ref's not looking! Have you the skills and cunning to become World Champion? Keyboard or joystick controls.

"Excellent boxing game"...Micro User

BLAGGER

A new, much-improved version of the classic Alligata Software game, with twenty tricky, but highly amusing levels.

"The game is a winner... very enjoyable, sure to give many hours of entertainment"
...Electron User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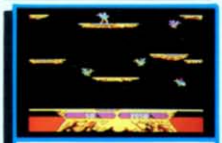
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PLAY IT AGAIN SAM 12
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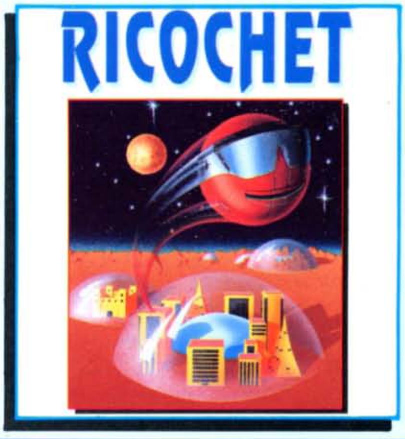

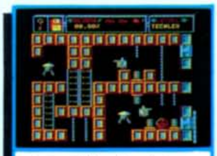
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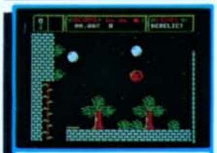
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RICOCHET
A Massive Arcade Adventure with Brilliant Graphics

RICOCHET has an amazing 330 different action-packed screens arranged over five levels. You get five games in one, since each level has its own distinctive theme, with superb graphics and unusual puzzles to solve.

You control SPRAT, the Small Partially Robotic Alien Time-traveller, in his quest to collect the five hour-glasses from the five worlds of RICOCHET. SPRAT can roll left and right, and can roll up and down ladders and ropes, but, his unique ability is that he can jump to different heights and in different directions. You have to control this fast-moving alien as he ricochets through the levels and solves the many clever puzzles.

You start in the FORTRESS world, with its alchemists and ghosts, and move on to TECHLEV with its high-tec graphics, and disc drives and tax demands. In DERELICT you explore a world that has fallen apart. THE UFO is a futuristic world with robots and ID machines. And finally to the ANCIENT world of Greece, to try and outwit Atlas and Hermes.

BBC Micro Cassette.....£9.95 each BBC Micro 5¼" Disc.....£11.95 each

(Compatible with the BBC B, B+ and Master 128 computers.)

BBC Master Compact 3½" Disc.....£14.95 each Electron Cassette.....£9.95 each

(The screen pictures show the BBC Micro versions of the games.)

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